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**New York State Testing Program  
Grade 3 Common Core  
Mathematics Test**

**Released Questions with Annotations**

**August 2014**





**THE STATE EDUCATION DEPARTMENT / THE UNIVERSITY OF THE STATE OF NEW YORK /  
ALBANY, NY 12234**

## **New York State Testing Program Grade 3 Common Core Mathematics Test**

### **Released Questions with Annotations**

With the adoption of the New York P-12 Common Core Learning Standards (CCLS) in ELA/Literacy and Mathematics, the Board of Regents signaled a shift in both instruction and assessment. Starting in Spring 2013, New York State began administering tests designed to assess student performance in accordance with the instructional shifts and the rigor demanded by the Common Core State Standards (CCSS). To aid in the transition to new assessments, New York State has released a number of resources, including test blueprints and specifications, sample questions, and criteria for writing assessment questions. These resources can be found at <http://www.engageny.org/common-core-assessments>.

New York State administered the ELA/Literacy and Mathematics Common Core tests in April 2014 and is now making a portion of the questions from those tests available for review and use. These released questions will help students, families, educators, and the public better understand how tests have changed to assess the instructional shifts demanded by the Common Core and to assess the rigor required to ensure that all students are on track to college and career readiness.

#### ***Annotated Questions Are Teaching Tools***

The released questions are intended to help educators, students, families, and the public understand how the Common Core is different. The annotated questions demonstrate the way the Common Core should drive instruction and how tests have changed to better assess student performance in accordance with the instructional shifts demanded by the Common Core. They are also intended to help educators identify how the rigor of the State tests can inform classroom instruction and local assessment. The annotations will indicate common student misunderstandings related to content standards; educators should use these to help inform unit and lesson planning. In some cases, the annotations may offer insight into particular instructional elements (conceptual thinking, visual models) that align to the Common Core that may be used in curricular design. It should not be assumed, however, that a particular standard will be measured with an identical question in future assessments.

The annotated questions will include both multiple-choice and constructed-response questions. With each multiple-choice question released, a rationale will be available to demonstrate why the question measures the intended standards; why the correct answer is correct; and why each wrong answer is plausible but incorrect. The rationales describe why the wrong answer choices are plausible but incorrect and are based in common errors in computation. While these rationales will speak to a possible and likely reason for selection of the incorrect option by the student, these rationales do not contain definitive statements as to why the student chose the incorrect option or what we can infer about knowledge and skills of the student based on their selection of an incorrect response. These multiple-choice questions are designed to assess student proficiency, not to diagnose specific misconceptions/errors with each and every incorrect option.

Additionally, for each constructed-response question, there will be an explanation for why the question measures the intended standards and sample student responses representing each possible score point.

Questions from the upper grades may feature more detailed annotations, as the questions tend to be more complex.

### ***Understanding Math Annotated Questions***

#### **Multiple Choice**

Multiple-choice questions are designed to assess CCLS for Mathematics. Mathematics multiple-choice questions will mainly be used to assess standard algorithms and conceptual standards. Multiple-choice questions incorporate both Standards and Standards for Mathematical Practices, some in real-world applications. Many multiple-choice questions require students to complete multiple steps. Likewise, many of these questions are linked to more than one standard, drawing on the simultaneous application of multiple skills and concepts. Within answer choices, distractors will all be based on plausible missteps.

Short- and extended- constructed-response questions may refer to the scoring rubric, which can be found in the Educator Guide to the 2014 Grade 3 Common Core Mathematics Test at [www.engageny.org/resource/test-guides-for-english-language-arts-and-mathematics](http://www.engageny.org/resource/test-guides-for-english-language-arts-and-mathematics).

#### **Short Response**

Short-response questions require students to complete a task and show their work. Like multiple-choice questions, short-response questions will often require multiple steps, the application of multiple mathematics skills, and real-world applications. Many of the short-response questions will cover conceptual and application Standards.

#### **Extended Response**

Extended-response questions ask students to show their work in completing two or more tasks or a more extensive problem. Extended-response questions allow students to show their understanding of mathematical procedures, conceptual understanding, and application. Extended-response questions may also assess student reasoning and the ability to critique the arguments of others.

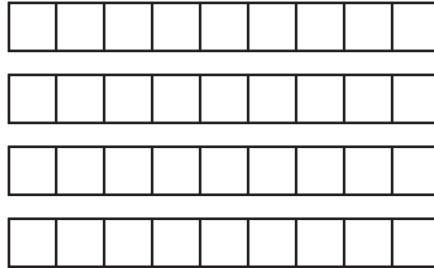
### ***Released Questions Do Not Comprise a "Mini" Test***

This document is NOT intended to show how operational tests look or to provide information about how teachers should administer the test; rather, the purpose of the released questions is to provide an overview of how the new test reflects the demands of the Common Core.

The released questions do not represent the full spectrum of standards assessed on the State test, nor do they represent the full spectrum of how the Common Core should be taught and assessed in the classroom. Specific criteria for writing test questions as well as additional instruction and assessment information is available at [www.engageny.org/common-core-assessments](http://www.engageny.org/common-core-assessments).



Which expression is represented by the model shown below?



- A**  $4 \times 9$
- B**  $9 \div 4$
- C**  $36 \times 4$
- D**  $9 \div 36$

**Key: A**

**Measured CCLS: 3.OA.1**

**Commentary:** This question measures 3.OA.1 by asking students to interpret a product of whole numbers as the total number of objects in groups. In this case, students interpret the product  $4 \times 9$  as four groups of nine.

#### Extended Rationale

**Answer Choice A:** " $4 \times 9$ "; This response correctly identifies the expression that represents the given model. The student most likely counted 4 groups of 9 objects and recognized that the model represents multiplication. The student who selects this response understands how to interpret products of whole numbers as the total number of objects in groups.


**Answer Choice B:** " $9 \div 4$ "; This response may reflect an error in determining what the model represents. The student may have recognized that there were 4 groups of 9 objects, but tried to divide instead of multiply. Additionally, the student may not understand how to interpret products of whole numbers as the total number of objects in groups.

**Answer Choice C:** " $36 \times 4$ "; This response may reflect an error in determining what the model represents. The student may know that  $4 \times 9 = 36$ , but may not have understood how to use the model to represent the expression and may have tried to multiply the product by 4 groups. The student who selects this response may not understand how to interpret products of whole numbers as the total number of objects in groups.

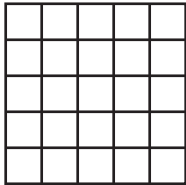
**Answer Choice D:** " $9 \div 36$ "; This response may reflect an error in determining what the model represents. The student may have recognized that  $4 \times 9 = 36$ , but may not have understood how to use the model to represent the expression and tried to divide the number of objects in each group by the product. The student who selects this response may not understand how to interpret products of whole numbers as the total number of objects in groups.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors made when interpreting products of whole numbers as the total number of objects in groups.

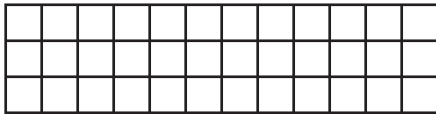
A playground has an area of 30 square meters. Which shape could represent the playground?

KEY	
	= 1 square meter

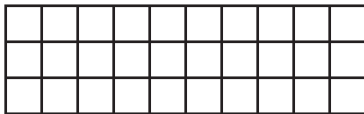
**A**



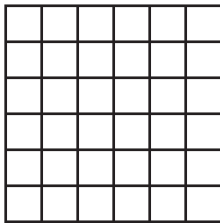
**B**



**C**



**D**



**Key: C**

**Measured CCLS: 3.MD.6**

**Commentary:** This question measures 3.MD.6 by asking the student to measure area by counting unit squares. Students must identify the figure that has an area of 30 square units.

### Extended Rationale

**Answer Choice A:** This response may reflect an error in counting unit squares. The student may have miscounted the total number of unit squares or the number of rows and columns. The student who selects this response may not understand how to measure area by counting unit squares.

**Answer Choice B:** This response may reflect an error in distinguishing area from perimeter. The student may have found the perimeter instead of the area, as this figure has a perimeter of 30 units. The student who selects this response may not understand how to measure area by counting unit squares.

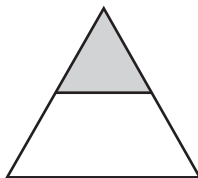
**Answer Choice C:** This response correctly identifies a figure with an area of 30 square units. The student may have counted the unit squares individually or multiplied the number of rows by the number of columns. The student who selects this response understands how to measure area by counting unit squares.

**Answer Choice D:** This response may reflect an error in counting unit squares. The student may have miscounted the total number of unit squares or the number of rows and columns. The student who selects this response may not understand how to measure area by counting unit squares.

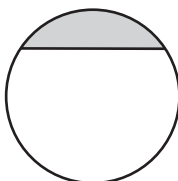
Answer choices A, B, and D are plausible but incorrect. They represent common student errors made when interpreting products of whole numbers as the total number of objects in groups.

Which figure is  $\frac{1}{2}$  shaded?

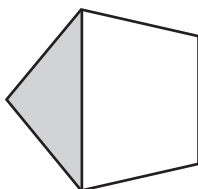
**A**



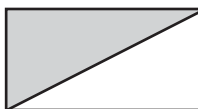
**B**



**C**



**D**



**Key: D**

**Measured CCLS: 3.NF.1**

**Commentary:** This question measures 3.NF.1 by asking the student to understand a fraction  $\frac{1}{b}$  as the quantity formed by 1 part when a whole is partitioned into  $b$  equal parts.

### Extended Rationale

**Answer Choice A:** This response may reflect an incomplete understanding of how to interpret a fraction. The student may have determined that the figure needed to have two parts, and one of those parts should be shaded, but did not realize the parts needed to be equal in size. The student who selects this response may not understand that fractions are formed from equal-sized parts of a whole.

**Answer Choice B:** This response may reflect an incomplete understanding of how to interpret a fraction. The student may have determined that the figure needed to have two parts, and one of those parts should be shaded, but did not realize the parts needed to be equal in size. The student who selects this response may not understand that fractions are formed from equal-sized parts of a whole.

**Answer Choice C:** This response may reflect an incomplete understanding of how to interpret a fraction. The student may have determined that the figure needed to have two parts, and one of those parts should be shaded, but did not realize the parts needed to be equal in size. The student who selects this response may not understand that fractions are formed from equal-sized parts of a whole.

**Answer Choice D:** This is the correct result when one part of a whole consisting of two equal-sized parts is shaded. The student may have understood that the denominator meant the whole consisted of two equal-sized parts and the numerator meant that one of those parts was shaded. The student who selects this response understands that a fraction  $1/b$  is the quantity formed by 1 part when a whole is partitioned into  $b$  equal parts.

Answer choices A, B, and C are plausible but incorrect. They represent a common student error made when understanding a fraction  $1/b$  as the quantity formed by 1 part when a whole is partitioned into  $b$  equal parts.

Kai separated 36 index cards into 4 equal stacks. Which number sentence could be used to determine the number of cards in each stack?

**A**  $4 \times \underline{\quad ? \quad} = 36$

**B**  $4 \div \underline{\quad ? \quad} = 36$

**C**  $\underline{\quad ? \quad} + 4 = 36$

**D**  $\underline{\quad ? \quad} \div 4 = 36$

**Key: A**

**Measured CCLS: 3.OA.6**

**Commentary:** This question measures 3.OA.6 by asking the student to understand division as an unknown-factor problem.

### Extended Rationale

**Answer Choice A:** " $4 \times \underline{\quad ? \quad} = 36$ "; This is correct. The student who selects this response understands the relationship between multiplication and division. Dividing 36 by 4 means that 4 can be multiplied by an unknown number to equal 36. The student who selects this response understands how to interpret division as an unknown-factor problem.

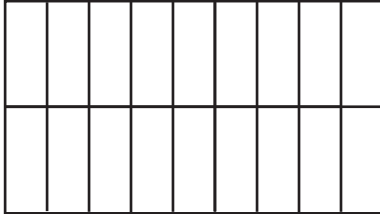
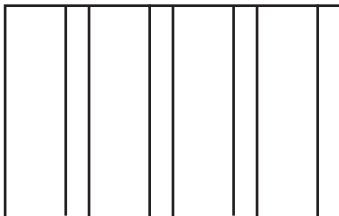
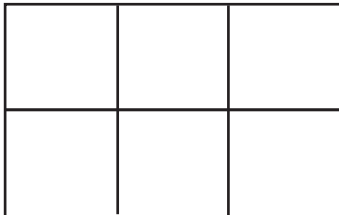
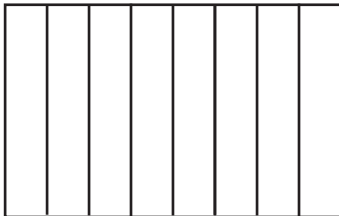
**Answer Choice B:** " $4 \div \underline{\quad ? \quad} = 36$ "; This response may indicate a lack of understanding of the relationship between multiplication and division. The student may have understood that a factor was missing but used division instead of multiplication. The student who selects this response may not understand how to interpret division as an unknown-factor problem.

**Answer Choice C:** " $\underline{\quad ? \quad} + 4 = 36$ "; This response may reflect an incomplete understanding of the relationship between multiplication and division. The student may have determined that 4 should be added to the unknown number to get 36. The student who selects this response may not understand that the question requires the use of multiplication or division and not addition.

**Answer Choice D:** " $\underline{\quad ? \quad} \div 4 = 36$ "; This response may reflect an incomplete understanding of the relationship between multiplication and division. The student may have thought a division sign should be used since the question being asked can be answered using a division expression different than the one shown here. The student who selects this response may not understand how to interpret division as an unknown-factor problem.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors made when understanding division as an unknown-factor problem.

Bruce made a game board by painting stripes on a rectangular piece of cardboard. Each stripe covered  $\frac{1}{8}$  of the rectangle. Which figure could represent the game board Bruce made?

**A****B****C****D****Key: D****Measured CCLS: 3.G.2**

**Commentary:** This question measures 3.G.2 by asking the student to recognize the representation of a unit fraction as a partition of a shape into parts with equal areas.

## Extended Rationale

**Answer Choice A:** This response may reflect a lack of understanding of how to interpret a fraction as a whole that is made up of equal-sized parts. The student may have determined that there were 9 equal parts in each row shown but did not realize that the fraction  $\frac{1}{8}$  means that there are 8 equal parts. The student who selects this response may not understand that the denominator represents the number of equal-sized parts in a whole.

**Answer Choice B:** This response may reflect an incomplete understanding of how to interpret a fraction as a whole that is made up of equal-sized parts. The student may have understood that the whole is made up of 8 parts but did not understand that the parts have to be of equal size. The student who selects this response may not understand that fractions are equal-sized parts of a whole.

**Answer Choice C:** This response may reflect an incomplete understanding of how to interpret a fraction. The student may have understood that the whole needs to consist of equal-sized parts but did not realize that the denominator represents the number of equal-sized parts in the whole. The student who selects this response may not understand how to interpret a denominator.

**Answer Choice D:** This is the correct response that shows a rectangle partitioned into 8 equal-sized parts. The student may have understood that the denominator of the fraction represents the number of equal-sized parts in the whole. The student who selects this response understands how to partition a shape into parts with equal areas.

Answer choices A, B, and C are plausible but incorrect. They represent common student errors made when representing a unit fraction as a partition of a shape into parts with equal areas.



Hilda and Mallory each have the same number of seashells.

- Hilda sorted her seashells into 3 groups with 8 seashells in each group.
- Mallory sorted her seashells into 6 equal groups.

How many seashells were in each of the groups Mallory made?

- A** 4
- B** 9
- C** 18
- D** 24

**Key: A**

**Measured CCLS: 3.OA.3**

**Commentary:** This question measures 3.OA.3 by asking the student to use multiplication and division within 100 to solve a word problem involving equal groups. Solving the problem involves using multiplication to find the total number of Mallory's shells, then division to determine the size of each group.

### Extended Rationale

**Answer Choice A:** "4"; This is the correct number of seashells in each of Mallory's groups. The student may have found the number of seashells in each of Mallory's groups by multiplying to find the total number of seashells each girl had and then multiplied or divided to find the number of seashells in Mallory's groups. The student who selects this response understands how to use multiplication and division within 100 to solve word problems involving equal groups.

$$3 \times 8 = 24,$$

$$24 \div 6 = 4 \text{ or } 6 \times 4 = 24$$

**Answer Choice B:** "9"; This response may reflect a lack of understanding of how to solve word problems of this type. The student may have added the number of Hilda's groups to the number of Mallory's groups. The student who selects this response may not understand how to use multiplication and division within 100 to solve word problems involving equal groups.

$$3 + 6 = 9$$

**Answer Choice C:** "18"; This response may reflect a lack of understanding of how to solve word problems of this type. The student may have thought that the number of groups of seashells each girl had should be multiplied. The student who selects this response may not understand how to use multiplication and division within 100 to solve word problems involving equal groups.

$$3 \times 6 = 18$$

**Answer Choice D:** "24"; This response may reflect a lack of understanding of how to solve word problems of this type. The student may have correctly multiplied to determine the total number of seashells Hilda had and was able to determine that Mallory needed to have the same number of seashells as Hilda, but then did not

determine the number of seashells in each of Mallory's groups. The student who selects this response may not understand how to use multiplication and division within 100 to solve word problems involving equal groups.

$$3 \times 8 = 24 \text{ and } 6 \times 4 = 24$$

Answer choices B, C, and D are plausible but incorrect. They represent common student errors made when using multiplication and division within 100 to solve word problems involving equal groups.

Which fraction is equivalent to  $\frac{2}{8}$ ?

**A**  $\frac{1}{8}$

**B**  $\frac{1}{4}$

**C**  $\frac{2}{4}$

**D**  $\frac{4}{8}$

**Key: B**

**Measured CCLS: 3.NF.3.b**

**Commentary:** This question measures 3.NF.3.b by asking the student to recognize or generate a simple equivalent fraction.

#### **Extended Rationale**

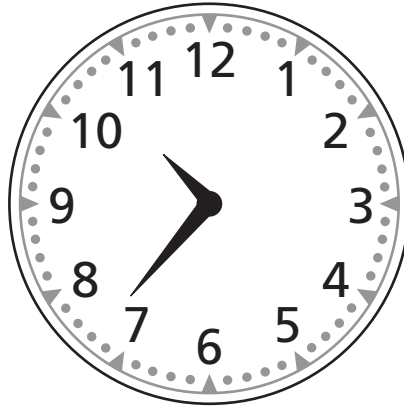
**Answer Choice A:** " $\frac{1}{8}$ "; This response may reflect a lack of understanding of how to recognize or generate an equivalent fraction. The student may have assumed that fractions with the same denominator are equivalent. The student who selects this response does not understand how to generate or recognize equivalent fractions.

**Answer Choice B:** " $\frac{1}{4}$ "; This is a correct fraction that is equivalent to  $\frac{2}{8}$ . The student may have drawn a number line or partitioned equal-sized shapes into fourths and eighths and noticed that  $\frac{1}{4}$  and  $\frac{2}{8}$  are the same position on the number line or that  $\frac{1}{4}$  of the area of a shape is the same size as  $\frac{2}{8}$  of the area. The student who selects this response understands how to recognize or generate an equivalent fraction.

**Answer Choice C:** " $\frac{2}{4}$ "; This response may reflect a lack of understanding of how to recognize or generate an equivalent fraction. If the student were to draw a number line divided into eighths and fourths, the student would see that  $\frac{2}{4}$  and  $\frac{2}{8}$  are not at the same point on the number line. Similarly, if the student partitioned the same-sized shapes into eighths and fourths, the student would see that  $\frac{2}{4}$  and  $\frac{2}{8}$  are not the same-sized areas of the shape. The student who selects this response does not understand how to generate or recognize equivalent fractions.

**Answer Choice D:** " $\frac{4}{8}$ "; This response may reflect a lack of understanding of how to recognize or generate an equivalent fraction. The student may have assumed that fractions with the same denominator are equivalent. The student who selects this response does not understand how to generate or recognize equivalent fractions. Answer choices A, C, and D are plausible but incorrect. They represent common student errors made when recognizing or generating an equivalent fraction.

What time is shown on the clock below?



- A** 7:10
- B** 10:07
- C** 10:37
- D** 11:37

**Key: C**

**Measured CCLS: 3.MD.1**

**Commentary:** This question measures 3.MD.1 by asking the student to tell time to the nearest minute.

#### **Extended Rationale**

**Answer Choice A:** "7:10"; This response may reflect a lack of understanding of how to read a clock. The student may have confused the hour hand and the minute hand. The student who selects this response may not fully understand the hands of a clock and how to interpret the time using them.

**Answer Choice B:** "10:07"; This response may reflect an error in interpreting the numbers on a clock when using the minute hand. The student may have understood that the smaller hand is the hour hand, and correctly identified 10:00, but may not have understood that the minute hand corresponds to the numbers on the clock in intervals of five minutes. The student who selects this response may not understand how to read the minute hand or the way that minutes are represented on a clock.

**Answer Choice C:** "10:37"; This is the correct result when the hour hand is read as the hour 10 and the minute hand as 37 minutes. The student may have understood what the hour and minute hands represent and what the numbers on the clock represent. The student who selects this response understands how to tell time to the nearest minute.

**Answer Choice D:** "11:37"; This response may reflect an error in reading the hour hand of a clock. The student may have understood that the minute hand represented 37 minutes, but may not have understood that the hour does not change to 11 until the minute hand has made a full 60-minute revolution around the clock. The student who selects this response may not understand how to interpret the hour hand of a clock.

Answer choices A, B, and D are plausible but incorrect. They represent common student errors made when telling time to the nearest minute.

Mr. Jacobs had 56 books in his office. He put an equal number of books on each of 7 shelves. The equation below can be used to determine the number of books he put on each shelf.

$$56 \div 7 = \underline{\quad? \quad}$$

How many books, in all, did Mr. Jacobs put on each shelf?

- A** 7
- B** 8
- C** 49
- D** 63

**Key: B**

**Measured CCLS: 3.OA.4**

**Commentary:** This question measures 3.OA.4 by asking the student to determine the unknown whole number in a division equation relating three whole numbers.

#### **Extended Rationale**

**Answer Choice A:** "7"; This response may reflect an error in using basic division or multiplication facts. The student may have incorrectly determined that  $56 \div 7 = 7$ . The student who selects this response may not remember or understand basic division or multiplication facts.

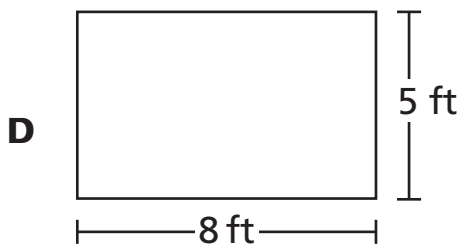
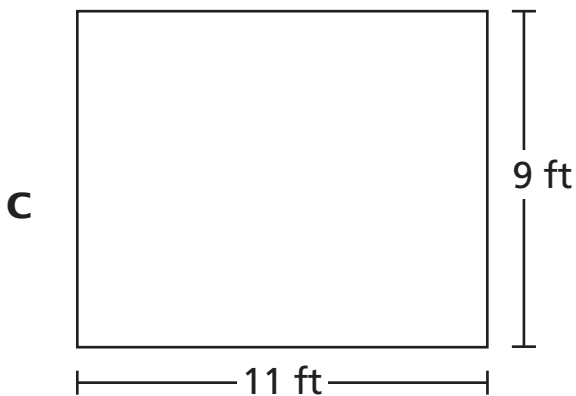
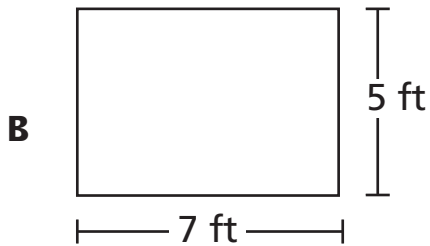
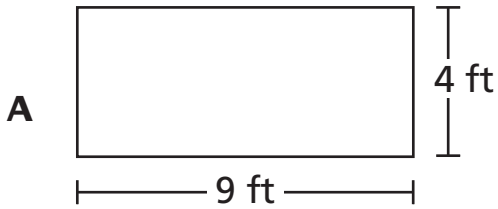
**Answer Choice B:** "8"; This is the correct result when 56 is divided by 7. The student may have known basic division facts or basic multiplication facts. The student who selects this response understands how to determine the unknown whole number in a division equation relating three whole numbers.

**Answer Choice C:** "49"; This response may reflect an incomplete understanding of what the equation represents. The student may have determined that 7 should be subtracted from 56. The student who selects this response may not understand that the equation requires the use of division and not subtraction.

**Answer Choice D:** "63"; This response may reflect an incomplete understanding of what the equation represents. The student may have determined that 7 should be added to 56. The student who selects this response may not understand that the equation requires the use of division and not addition.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors made when determining the unknown whole number in a division equation relating three whole numbers.

Mandy's garden is shaped like a rectangle. It has a total area of 40 square feet. Which figure could represent Mandy's garden?



**Key: D**

**Measured CCLS: 3.MD.7.b**

**Commentary:** This question measures 3.MD.7b by asking the student to multiply the side lengths to find the area of a rectangle with whole-number side lengths in the context of solving a real-world problem.

## Extended Rationale

**Answer Choice A:** This response may reflect an error in basic multiplication facts. The student may have understood that the side lengths of the rectangle should be multiplied, but thought that  $9 \times 4 = 40$ . The student who selects this response may not understand basic multiplication facts.

**Answer Choice B:** This response may reflect an error in basic multiplication facts. The student may have understood that the side lengths of the rectangle should be multiplied, but thought that  $7 \times 5 = 40$ . The student who selects this response may not understand basic multiplication facts.

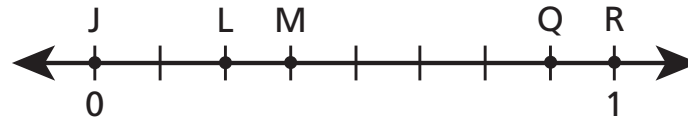
**Answer Choice C:** This response may reflect an error in using the given side lengths of a rectangle to find its area. The student may have understood that the given lengths needed to be manipulated, but confused area with perimeter and calculated  $9 + 9 + 11 + 11 = 40$ . The student who selects this response may not understand how to distinguish between area and perimeter.

**Answer Choice D:** This is the correct response that shows a figure with an area of 40 square feet. The student may have understood that in order for a rectangle to have an area of 40 square feet, the length and width must multiply to equal 40. The student who selects this response understands how to find the area of a rectangle using whole-number side lengths.

Answer choices A, B, and C are plausible but incorrect. They represent common student errors made when finding the area of a rectangle by multiplying whole-number side lengths.



The number line below shows five points, labeled J, L, M, Q, and R.



Which two points have a distance of  $\frac{3}{8}$  between them?

- A** J and L
- B** J and M
- C** L and Q
- D** M and R

**Key: B**

**Measured CCLS: 3.NF.2.b**

**Commentary:** This question measures 3.NF.2.b by asking the student to recognize a fraction  $\frac{a}{b}$  on a number line diagram by marking off  $a$  lengths  $\frac{1}{b}$  from 0 and recognize that the resulting interval has size  $\frac{a}{b}$ .

#### Extended Rationale

**Answer Choice A:** "J and L"; This response may reflect an incomplete understanding of how to read a number line. The student may have realized the number line was in eighths but started counting the tick marks at 0 instead of from 0. The student who selects this response may not understand how to determine the size of an interval on a number line.

**Answer Choice B:** "J and M"; This is the correct pair of points on the number line with a distance of  $\frac{3}{8}$  between them. The student may have understood that the number line represents eighths and counted three tick marks from J to M. The student who selects this response understands how to recognize a fraction  $\frac{a}{b}$  on a number line diagram by marking off  $a$  lengths  $\frac{1}{b}$  from 0. The student recognizes that the resulting interval has size  $\frac{a}{b}$ .

**Answer Choice C:** "L and Q"; This response may reflect an incomplete understanding of how fractions are represented on a number line and how to find the difference between them. The student may have started counting at 0 and counted 3 tick marks, then 8 tick marks, locating points L and Q. The student who selects this response may not understand how to determine the size of an interval on a number line.

**Answer Choice D:** "M and R"; This response may reflect an incomplete understanding of how fractions are represented on a number line and how to determine the size of an interval on a number line. The student may have started counting 3 intervals and 8 intervals from 0, locating points M and R. The student who selects this response may not understand how to find the distance between points on a number line.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors made when recognizing a fraction  $\frac{a}{b}$  on a number line diagram by marking off  $a$  lengths  $\frac{1}{b}$  from 0 and recognizing that the resulting interval has size  $\frac{a}{b}$ .

Jerome had 23 farm animal stickers and 17 sea animal stickers. Jerome used all of the stickers to fill an 8-page scrapbook. He put the same number of stickers on each page. How many stickers did he put on each page?

- A** 5
- B** 6
- C** 32
- D** 40

**Key: A**

**Measured CCLS: 3.OA.8**

**Commentary:** This question measures 3.OA.8 by asking the student to solve two-step word problems using the operations of addition and division.

#### **Extended Rationale**

**Answer Choice A: "5";** This is the correct number of stickers on each page of the scrapbook. The student may have understood that the number of farm animal stickers and the number of sea animal stickers should be added together and that their sum should be divided by 8, the number of pages in the scrapbook. The student who selects this response understands how to solve two-step word problems using addition and division.

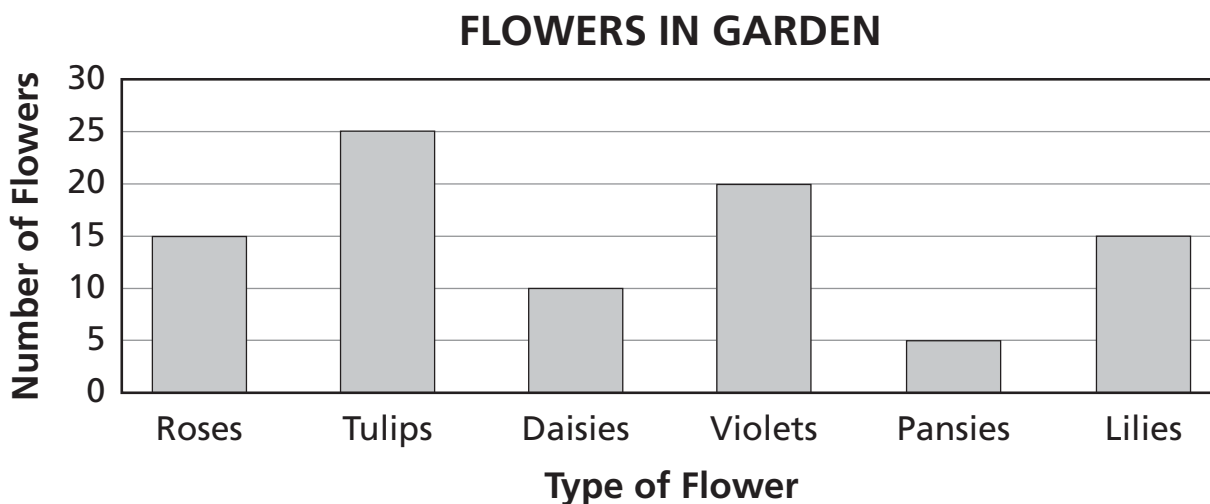
**Answer Choice B: "6";** This response may reflect an error in interpreting the question. The student may not have understood which operations should be used to answer the question, and subtracted 17 from 23 to get 6. The student who selects this response may not understand how to interpret a two-step word problem.

**Answer Choice C: "32";** This response may reflect an error in using division to make equal-sized groups. The student may have understood that the number of farm animal stickers and the number of sea animal stickers needed to be added together, but instead of dividing that sum by 8, the student subtracted 8 from the sum. The student who selects this response may not understand how to use division to make equal-sized groups when solving a word problem.

**Answer Choice D: "40";** This response may reflect an error in interpreting the question. The student may have understood that the number of farm animal stickers and the number of sea animal stickers needed to be added together, but may not have understood that the sum of those stickers should be divided by 8. The student who selects this response may not understand how to interpret a two-step word problem.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors made when solving two-step word problems using addition and division.

Ms. Jones has six types of flowers in her garden. The bar graph below shows the number of each type of flower.



Based on the bar graph, which sentence is true?

- A** Ms. Jones has 25 more tulips than pansies.
- B** Ms. Jones has 10 more lilies than daisies.
- C** Ms. Jones has 5 more violets than lilies.
- D** Ms. Jones has 5 more roses than pansies.

**Key: C**

**Measured CCLS: 3.MD.3**

**Commentary:** This question measures 3.MD.3 by asking the student to solve a “how many more” problem using information presented in a scaled bar graph.

### Extended Rationale

**Answer Choice A:** “Ms. Jones has 25 more tulips than pansies.”; This response may reflect an error in understanding how to solve “how many more” problems on a bar graph. The student may have determined that 25 tulips were represented on the graph but did not understand that the difference between the number of tulips and the number of pansies needed to be 25 in order for the sentence to be true. The student who selects this response may not understand how to interpret “how many more” problems based on a bar graph.

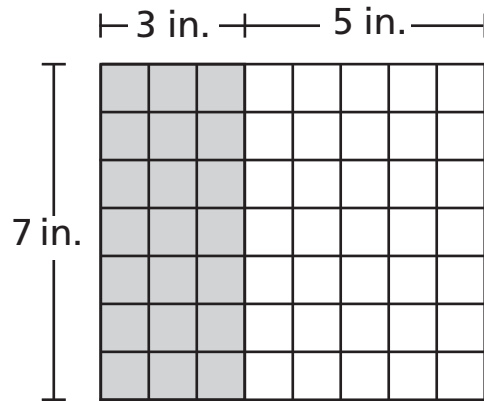
**Answer Choice B:** “Ms. Jones has 10 more lilies than daisies.”; This response may reflect an error in reading and interpreting a scaled bar graph. The student may have confused daisies and pansies, simply found the type of flower with 10 (daisies), or misinterpreted the scale when finding the difference between daisies and lilies. The student who selects this response may not understand how to read and interpret a scaled bar graph.

**Answer Choice C:** “Ms. Jones has 5 more violets than lilies.”; This is the correct result when the categories and intervals on a scaled bar graph are interpreted and compared correctly. The student may have understood that the number of lilies, 15, should be subtracted from the number of violets, 20, to determine that there are, in fact, 5 more violets than lilies. The student who selects this response understands how to interpret the intervals on a scaled bar graph and interpret “how many more” problems on a bar graph.

**Answer Choice D:** “Ms. Jones has 5 more roses than pansies.”; This response may reflect an error in reading and interpreting a scaled bar graph. The student may have confused daisies and pansies, simply found the type of flower with 5 (pansies), or misinterpreted the scale when finding the difference between roses and lilies. The student who selects this response may not understand how to read and interpret “how many more” problems on a scaled bar graph.

Answer choices A, B, and D are plausible but incorrect. They represent common student errors made when interpreting intervals or “how many more” problems related to a scaled bar graph.

Ryan used square tiles to make the design shown below. He used gray tiles and white tiles.



Which expression could be used to find the total area, in square inches, of Ryan's design?

- A**  $(7 \times 3) + (7 \times 5)$
- B**  $(7 + 3) \times (7 + 5)$
- C**  $3 \times 5 \times 7$
- D**  $3 + 5 + 7$

**Key: A**

**Measured CCLS: 3.MD.7.c**

**Commentary:** This question measures 3.MD.7.c by asking the student to use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths  $a$  and  $b + c$  is the sum of  $a \times b$  and  $a \times c$ .

### Extended Rationale

**Answer Choice A:** " $(7 \times 3) + (7 \times 5)$ "; This is the correct expression that can be used to find the total area of Ryan's design. The student may have understood that the shaded area can be expressed by  $7 \times 3$  and that the unshaded area can be expressed by  $7 \times 5$ , and that the two products can be added to find the total area of the rectangle. The student who selects this response understands how to write an expression to represent tiling on a rectangle with whole-number side lengths.

**Answer Choice B:** " $(7 + 3) \times (7 + 5)$ "; This response may reflect an error in understanding that the area of a rectangle can be found by multiplying side lengths and that areas are additive. The student may have understood which numbers to use to represent the shaded and unshaded areas but did not understand which operations to use to find the total area, misapplying addition and multiplication. The student who selects this response may not understand how to write an expression to represent the tiling shown.

**Answer Choice C:** " $3 \times 5 \times 7$ "; This response may reflect an error in interpreting the measurements given in the tiled rectangle. The student may have understood that the area of a rectangle equals length times width, but did not understand that the 3 and 5 given for the length represent a total of 8 and not a product of 15. The student who selects this response may not understand how to interpret the measurements given in the tiled rectangle.

**Answer Choice D:** " $3 + 5 + 7$ "; This response may reflect a lack of understanding of how to find the area of a rectangle. The student may not have understood how to find the area of a rectangle, so simply added all of the numbers shown. The student who selects this response may not understand the definition of area.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors made when using tiling to show a concrete case that the area of a rectangle with whole-number side lengths  $a$  and  $b + c$  is the sum of  $a \times b$  and  $a \times c$ .

If each side of a square has a length of 1 unit, which statement about the square is true?

- A** The square is a unit square that can be used to measure mass.
- B** The square is a unit square that can be used to measure area.
- C** The square is a unit square that can be used to measure volume.
- D** The square is a unit square that can be used to measure weight.

**Key: B**

**Measured CCLS: 3.MD.5.a**

**Commentary:** This question measures 3.MD.5.a by asking the student to recognize that a square with side length of 1 unit, called a “unit square,” is said to have “one square unit” of area and can be used to measure area.

#### **Extended Rationale**

**Answer Choice A:** “The square is a unit square that can be used to measure mass.” This response may reflect a lack of understanding of what a unit square is intended to measure. The student may have confused mass with area. The student who selects this response may not understand that the unit square is used to measure area.

**Answer Choice B:** “The square is a unit square that can be used to measure area.” This is the correct response because a unit square can be used to measure area. The student who selects this response understands that a square with side length of 1 unit, called a “unit square,” is said to have “one square unit” of area and can be used to measure area.

**Answer Choice C:** “The square is a unit square that can be used to measure volume.” This response may reflect a lack of understanding of what a unit square is intended to measure. The student may have confused volume with area. The student who selects this response may not understand that the unit square is used to measure area.

**Answer Choice D:** “The square is a unit square that can be used to measure weight.” This response may reflect a lack of understanding of what a unit square is intended to measure. The student may have confused weight with area. The student who selects this response may not understand that the unit square is used to measure area.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors made when recognizing that a square with side length of 1 unit, called a “unit square,” is said to have “one square unit” of area and can be used to measure area.

Which number sentence can be used to determine the value of  $72 \div 9$ ?

**A**  $9 \times \underline{\quad ? \quad} = 72$

**B**  $9 + \underline{\quad ? \quad} = 72$

**C**  $9 \times 72 = \underline{\quad ? \quad}$

**D**  $9 + 72 = \underline{\quad ? \quad}$

**Key: A**

**Measured CCLS: 3.OA.6**

**Commentary:** This question measures 3.OA.6 by asking the student to understand division as an unknown-factor problem.

### Extended Rationale

**Answer Choice A:** " $9 \times \underline{\quad ? \quad} = 72$ "; This is the correct number sentence that can be used to determine  $72 \div 9$ . The student may have understood that the unknown factor in the multiplication equation is equal to the quotient of  $72 \div 9$ . The student who selects this response understands how to interpret division as an unknown-factor problem.

**Answer Choice B:** " $9 + \underline{\quad ? \quad} = 72$ "; This response may reflect a lack of understanding of division as an unknown factor problem. The student may have thought addition could be used to represent an equation that would have the same value as  $72 \div 9$ . The student who selects this response may not understand division as an unknown factor problem.

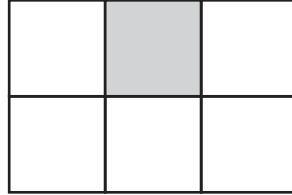
**Answer Choice C:** " $9 \times 72 = \underline{\quad ? \quad}$ "; This response may reflect a lack of understanding of division as an unknown factor problem. The student may have some understanding that multiplication can be used to find the answer to a division problem but did not understand how to set up a multiplication equation that would determine the value of  $72 \div 9$ . The student who selects this response may not understand division as an unknown factor problem.

**Answer Choice D:** " $9 + 72 = \underline{\quad ? \quad}$ "; This response may reflect a lack of understanding about division as an unknown factor problem. The student may have thought addition could be used to represent an equation that would have the same value as  $72 \div 9$ . The student who selects this response may not understand division as an unknown factor problem.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors made when interpreting division as an unknown-factor problem.



Mr. Lopez divided his garden into equal parts for planting, as shown in the diagram below. The shaded part of the diagram shows where he planted carrots.



Which fraction of the garden is planted with carrots?

- A**      $\frac{1}{6}$
- B**      $\frac{1}{5}$
- C**      $\frac{1}{3}$
- D**      $\frac{1}{2}$

**Key: A**

**Measured CCLS: 3.NF.1**

**Commentary:** This question measures 3.NF.1 by asking the student to understand a fraction  $1/b$  as the quantity formed by 1 part when a whole is partitioned into  $b$  equal parts.

#### Extended Rationale

**Answer Choice A:** " $\frac{1}{6}$ "; This is the correct fraction that represents a whole partitioned into 6 equal parts, when 1 of the parts is shaded. The student may have understood that the denominator was the number of equal-sized parts and the numerator was the number of parts shaded. The student who selects this response may understand how to represent a fraction as  $1/b$  when a whole is partitioned into  $b$  equal parts.

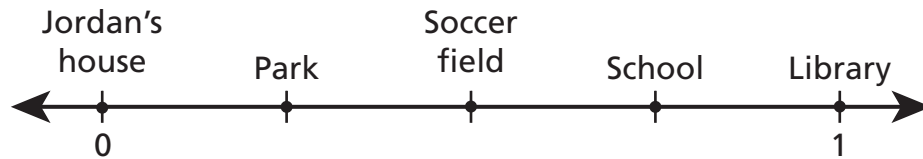
**Answer Choice B:** " $\frac{1}{5}$ "; This response may reflect a lack of understanding of how to determine the denominator of a fraction. The student may have understood that the whole was made up of 6 equal-sized parts but did not understand that the denominator should reflect the number of equal parts, not the number of unshaded equal parts. The student who selects this response may not understand how to interpret the denominator in a fraction.

**Answer Choice C:** " $\frac{1}{3}$ "; This response may reflect a lack of understanding of how to determine the denominator of a fraction. The student may have thought the figure was divided into 2 rows of 3 squares, so the denominator should be 3, the number of equal-sized squares in one row. The student who selects this response may not understand how to determine the denominator in a figure partitioned into equal-sized parts.

**Answer Choice D:** " $\frac{1}{2}$ "; This response may reflect a lack of understanding of what the numerator and denominator in a fraction represent. The student may have thought the figure was divided into two parts, shaded and unshaded, therefore 1 square was shaded out of two possible choices, shaded or unshaded. The student who selects this response may not understand how to determine what the numerator and denominator in a fraction represent.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors made when understanding a fraction  $1/b$  as the quantity formed by 1 part when a whole is partitioned into  $b$  equal parts.

The points on the number line represent the distances of 4 different locations from Jordan's house. The library is one mile from Jordan's house.



What location is  $\frac{2}{4}$  mile from Jordan's house?

- A** the park
- B** the school
- C** the library
- D** the soccer field

**Key: D**

**Measured CCLS: 3.NF.2.b**

**Commentary:** This question measures 3.NF.2.b by asking the student to represent a fraction  $\frac{a}{b}$  on a number line diagram by marking off  $a$  lengths  $\frac{1}{b}$  from 0. In this case,  $a = 2$  and  $b = 4$ , so the number line is marked off in lengths  $\frac{1}{4}$  from 0.

#### Extended Rationale

**Answer Choice A:** "the park"; This response may reflect a lack of understanding of how to read and interpret a number line. The student may have determined that the 2 in the numerator meant to count over two tick marks from 0, including the tick mark at 0. The student who selects this response may not understand that the number line is marked off in lengths of  $\frac{1}{4}$ .

**Answer Choice B:** "the school"; This response may reflect a lack of understanding of how to read and interpret a number line. The student may have determined that the 2 in the numerator meant to count over two points from 1 but included 1. The student who selects this response may not understand that the number line is marked off in lengths of  $\frac{1}{4}$ .

**Answer Choice C:** "the library"; This response may reflect a lack of understanding of how to read and interpret a number line. The student may have determined that the 4 in the denominator meant to count over four tick marks from 0. The student who selects this response may not understand that the number line is marked off in lengths of  $\frac{1}{4}$ .

**Answer Choice D:** "the soccer field"; This is the correct location that is:  $\frac{2}{4}$  mile from Jordan's house. The student may have understood that each interval on the number line represented one-fourth and that the numerator in  $\frac{2}{4}$  meant to count over two intervals from 0. The student who selects this response understands how to read and interpret a number line.

Answer choices A, B, and C are plausible but incorrect. They represent common student errors made when representing a fraction  $\frac{a}{b}$  on a number line diagram by marking off  $a$  lengths  $\frac{1}{b}$  from 0.

The rectangular floor of a bathroom is 6 feet wide and 7 feet long. What is the total area, in square feet, of the floor of the bathroom?

- A** 13
- B** 26
- C** 42
- D** 48

**Key: C**

**Measured CCLS: 3.MD.7.b**

**Commentary:** This question measures 3.MD.7.b by asking the student to multiply side lengths to find the area of a rectangle with whole number side lengths in the context of solving a real-world problem.

### Extended Rationale

**Answer Choice A:** "13"; This response may reflect a lack of understanding of how to determine the area of a rectangle given only the dimensions. The student may have understood that the calculation should involve two side lengths of the rectangular bathroom floor but added the numbers instead of multiplying them. The student who selects this response may not understand how to multiply side lengths to determine rectangular area in context.

$$6 + 7 = 13$$

**Answer Choice B:** "26"; This response may reflect an error in distinguishing between the definitions of area and perimeter. The student may have added the lengths of all four sides of the rectangular bath floor and found the perimeter. The student who selects this response may not understand how to distinguish between area and perimeter.

$$6 + 6 + 7 + 7 = 26$$

**Answer Choice C:** "42"; This is the correct result when a side length 6 feet is multiplied by a side length 7 feet to get an area of 42 square feet. The student may have understood that the two side lengths of the rectangular bathroom floor should be multiplied to find the area. The student who selects this response understands to multiply side lengths to determine rectangular area.

$$6 \times 7 = 42$$

**Answer Choice D:** "48"; This response may reflect an error in basic multiplication facts. The student may have understood that the side lengths should be multiplied to find the area of the bathroom floor but incorrectly calculated that  $6 \times 7$  would equal 48. The student who selects this response may not understand basic multiplication facts.

Answer choices A, B, and D are plausible but incorrect. They represent common student errors made when finding the area of a rectangle by multiplying side lengths with whole number side lengths in the context of solving a real-world problem.

Wendy cut a board into 4 pieces of equal sizes to make a table. Which fraction of the whole board does each piece represent?

**A**  $\frac{1}{4}$

**B**  $\frac{1}{1}$

**C**  $\frac{4}{4}$

**D**  $\frac{4}{1}$

**Key: A**

**Measured CCLS: 3.NF.1**

**Commentary:** This question measures 3.NF.1 by asking the student to understand a fraction  $1/b$  as the quantity formed by 1 part when a whole is partitioned into  $b$  equal parts. In this case, students must understand that when a single board is cut into four equal pieces,  $\frac{1}{4}$  is the fraction of the whole board that each piece represents.

### Extended Rationale

**Answer Choice A:** " $\frac{1}{4}$ "; This is the correct fraction that represents one part when a whole is partitioned into 4 equal-sized parts. The student may have understood that the denominator of the fraction represents the number of equal-sized parts the board was divided into and understood that each of the four parts represents  $\frac{1}{4}$ . The student who selects this response understands a fraction  $1/b$  is the quantity formed by 1 part when a whole is partitioned into  $b$  equal parts.

**Answer Choice B:** " $\frac{1}{1}$ "; This response may reflect a lack of understanding of how to interpret the parts of a fraction. The student may have determined that each part of the board should be represented as 1 in both the numerator and denominator. The student who selects this response may not understand that a fraction  $1/b$  is the quantity formed by one part when a whole is partitioned into  $b$  equal parts.

**Answer Choice C:** " $\frac{4}{4}$ "; This response may reflect a lack of understanding of how to interpret a fraction. The student may have determined that each part should be represented with a 4 in both the numerator and denominator. The student who selects this response may not understand that a fraction  $1/b$  is the quantity formed by one part when a whole is partitioned into  $b$  equal parts.

**Answer Choice D:** " $\frac{4}{1}$ "; This response may reflect a lack of understanding of how to interpret the parts of a fraction. The student may have understood that there were 4 equal-sized parts and that each piece represented 1 but reversed the two numbers when writing the fraction. The student who selects this response may not understand that a fraction  $1/b$  is the quantity formed by one part when a whole is partitioned into  $b$  equal parts.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors made when understanding a fraction  $1/b$  as the quantity formed by 1 part when a whole is partitioned into  $b$  equal parts.

What number goes in the blank to make the number sentence true?

$$12 \times 2 = (\underline{\quad? \quad} \times 2) + (2 \times 2)$$

- A** 10
- B** 12
- C** 20
- D** 24

**Key: A**

**Measured CCLS: 3.OA.5**

**Commentary:** This question measures 3.OA.5 by asking the student to apply the distributive property as a strategy to multiply.

#### **Extended Rationale**

**Answer Choice A:** "10"; This is the correct number that goes in the blank to make the number sentence true. The student may have understood that 12 could be represented as  $10 + 2$  and that  $(10 \times 2) + (2 \times 2)$  is equivalent to  $12 \times 2$ . The student who selects this response understands how to apply the distributive property as a strategy to multiply.

**Answer Choice B:** "12"; This response may reflect a lack of understanding of how to apply the distributive property as a strategy for multiplication. The student may have recognized an opportunity to apply the commutative property of multiplication, without considering the entire equation. The student may have determined that  $12 \times 2$  was the same as  $2 \times 12$  and did no further work. The student who selects this response may not understand how to use the distributive property as a strategy to multiply.

**Answer Choice C:** "20"; This response may reflect errors in interpreting expressions and equations. The student may have confused the multiplication signs with addition signs and determined that  $(18 + 2) + (2 + 2) = 24$ . The student who selects this response may not understand how to read and interpret symbols for operations in expressions and equations.

**Answer Choice D:** "24"; This response may reflect errors in using properties as strategies for multiplication. The student may have understood that  $12 \times 2 = 24$  but ignored the expression on the right side of the equation. The student who selects this response may not understand how to read and interpret expressions and equations.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors made when applying the distributive property as a strategy to multiply.



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What is 345 rounded to the nearest 100?

- A** 300
- B** 340
- C** 350
- D** 400

**Key: A**

**Measured CCLS: 3.NBT.1**

**Commentary:** This question measures 3.NBT.1 by asking the student to use place value to round a whole number to the nearest 100.

### **Extended Rationale**

**Answer Choice A:** "300"; This is the correct result when 345 is rounded to the nearest 100. This student may have understood that 345 is situated between 300 and 400, and that the values in the tens and ones places indicate that it is closer to 300. The student who selects this response understands how to use place value to round whole numbers to the nearest 100.

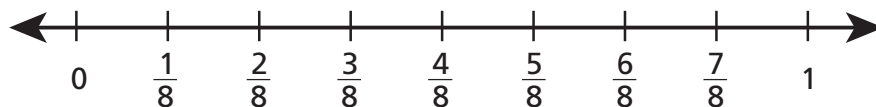
**Answer Choice B:** "340"; This response may reflect errors in identifying place value and in rounding. The student may have attempted to round to the nearest ten and may have thought that this could be done by rewriting the number in the ones place as zero. The student who selects this response may not understand how to use place value to round whole numbers to the nearest 100.

**Answer Choice C:** "350"; This response may reflect an error in identifying place value. The student may have rounded to the nearest 10 instead of the nearest 100. The student who selects this response may not understand how to use place value to round whole numbers to the nearest 100.

**Answer Choice D:** "400"; This response may reflect an error in rounding. The student may have understood which place value to round to, but most likely did not understand how to use the numbers in the tens and ones place to determine whether to round down to 300 or up to 400. The student who selects this response may not understand how to use place value to round whole numbers to the nearest 100.

Answer choices B, C, and D are plausible but incorrect. They represent common student errors made when using place value to round a whole number to the nearest 100.

A number line is shown below.



Which pair of fractions is equivalent?

- A**  $\frac{5}{8}$  and  $\frac{2}{4}$
- B**  $\frac{2}{4}$  and  $\frac{4}{8}$
- C**  $\frac{3}{8}$  and  $\frac{2}{4}$
- D**  $\frac{2}{4}$  and  $\frac{2}{8}$

**Key: B**

**Measured CCLS: 3.NF.3.a**

**Commentary:** This question measures 3.NF.3.a by asking the student to understand two fractions as equivalent if they are the same size, or the same point on a number line.

### Extended Rationale

**Answer Choice A:** " $\frac{5}{8}$  and  $\frac{2}{4}$ "; This response may reflect a lack of understanding of how to find an equivalent fraction. The student may not have understood how to divide the given number line into fourths to determine if  $\frac{2}{4}$  and  $\frac{5}{8}$  are at the same point on the number line. The student who selects this response may not understand that equivalent fractions have to be the same point on the number line or the same size of the same-size whole.

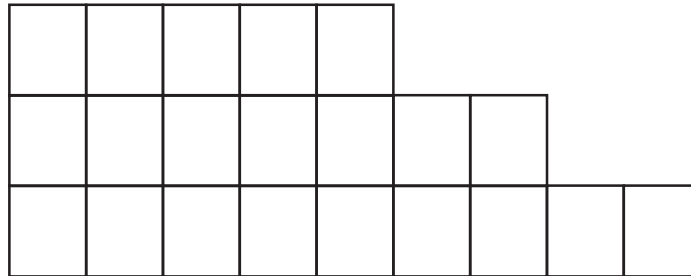
**Answer Choice B:** " $\frac{2}{4}$  and  $\frac{4}{8}$ "; This is the correct pair of equivalent fractions. The student may have understood how to divide the given number line into fourths and that  $\frac{2}{4}$  and  $\frac{4}{8}$  are the same point on the number line. The student who selects this response understands how to find an equivalent fraction.

**Answer Choice C:** " $\frac{3}{8}$  and  $\frac{2}{4}$ "; This response may reflect a lack of understanding of how to find an equivalent fraction. The student may not have understood how to divide the given number line into fourths to determine if  $\frac{3}{8}$  and  $\frac{2}{4}$  are at the same point on the number line. The student who selects this response may not understand that equivalent fractions have to be the same point on the number line or the same size of the same-size whole.

**Answer Choice D:** " $\frac{2}{4}$  and  $\frac{2}{8}$ "; This response may reflect a lack of understanding of how to find an equivalent fraction. The student may have assumed incorrectly that fractions with like numerators are always equivalent. The student who selects this response may not understand how to find an equivalent fraction.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors made when understanding two fractions as equivalent if they are the same point on a number line.

The first row in a pattern of tiles had 5 tiles. Each row after the first had 2 more tiles than the row before it, as shown below.



Which statement is true about the number of tiles in any row?

- A** It is divisible by 10.
- B** It is an even number.
- C** It is a multiple of 3.
- D** It is an odd number.

**Key: D**

**Measured CCLS: 3.OA.9**

**Commentary:** This question measures 3.OA.9 by asking the student to identify and explain an arithmetic pattern and explain the pattern.

### Extended Rationale

**Answer Choice A:** "It is divisible by 10." This response may reflect an incomplete understanding of the pattern. The student may have confused multiplication and addition and did not count the first row, multiplying each row by 5, so that all rows (except the first) are divisible by 10. The student who selects this response may not understand how to identify or explain an arithmetic pattern.

**Answer Choice B:** "It is an even number." This response may reflect an incomplete understanding of how to identify an arithmetic pattern. The student may have determined that 2 squares were added to the end of each row and 2 is an even number. The student who selects this response may not understand how to identify or explain an arithmetic pattern.


**Answer Choice C:** "It is a multiple of 3." This response may reflect an incomplete understanding of how to identify a pattern. The student may have only counted the last row of squares and determined that 9 is divisible by 3. The student who selects this response may not understand that each iteration of the pattern must use the same rule.

**Answer Choice D:** "It is an odd number." This is the correct response, which describes the pattern shown. The student may have understood that the pattern was 5, 7, 9, which are all odd numbers. The student who selects this response understands how to identify or explain an arithmetic pattern.

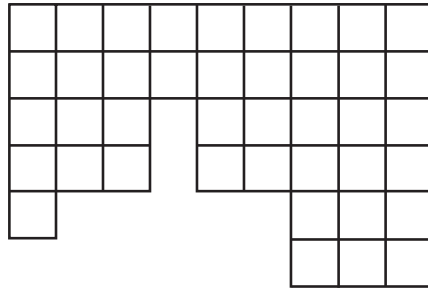
Answer choices A, B, and C are plausible but incorrect. They represent common student errors made when identifying and explaining an arithmetic pattern.

Which figure below has an area of 36 square units?

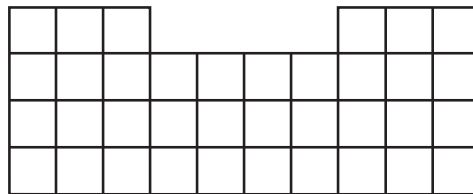
**KEY**

 = 1 square unit

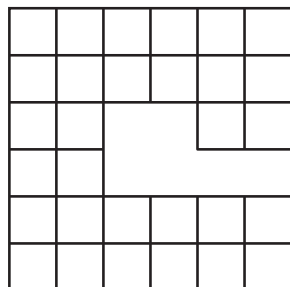
**A**



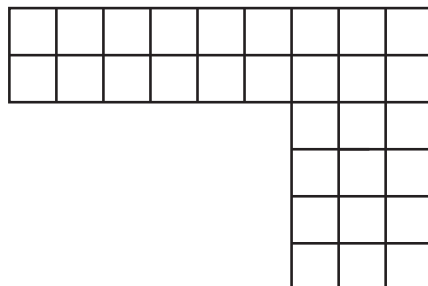
**B**



**C**



**D**



**Key: B**

**Measured CCLS: 3.MD.6**

**Commentary:** This question measures 3.MD.6 by asking the student to measure area by counting unit squares.

## Extended Rationale

**Answer Choice A:** This response may reflect an error in distinguishing between area and perimeter. The student may have counted the outer edges of the squares in the figure to find the perimeter of the figure, 36. The student who selects this response may not understand that finding area and finding perimeter are different processes.

**Answer Choice B:** This is the correct result when the unit squares in the figure are counted to find the area. The student may have understood that the squares in the figure could be counted to find an area of 36 square units. The student who selects this response may understand how to find the area of a figure by counting unit squares.

**Answer Choice C:** This response may reflect an error in counting unit squares to find the area of a figure. The student may have tried to multiply 6 times 6, since these are the greatest side lengths of the figure. The student who selects this response may not understand how to find area by counting unit squares.

**Answer Choice D:** This response may reflect an error in counting unit squares to find the area of a figure. The student may have tried to partition the figure into two rectangles, but left the six squares in the top right corner as part of both rectangles, therefore getting an answer of  $(9 \times 2) + (3 \times 6) = 36$ . The student who selects this response may not understand how to find area by counting unit squares.

Answer choices A, C, and D are plausible but incorrect. They represent common student errors made when measuring area by counting unit squares.

Jimmy's teacher asked him to describe a situation in which the number of objects could be represented by  $24 \div 4$ .

Jimmy started his description, shown below. Complete the description so that the number of objects can be represented by  $24 \div 4$ .

A pet store had a total of 24 fish. \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Measured CCLS: 3.OA.2**

**Commentary:** This question measures 3.OA.2 because it assesses a student's ability to interpret whole-number quotients of whole numbers as the number of objects in each share or the number of shares.


**Extended Rationale:** This question asks the student to complete a word problem in which the number of objects can be represented by  $24 \div 4$ . The student must give a narrative description of the situation. As indicated in the rubric, student responses will be rated on whether they show sufficient work to indicate a thorough understanding of interpreting whole-number quotients of whole numbers as the number of objects in each share or the number of shares. The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

The correct description is a narrative in which the 24 fish are somehow divided into 4 equal-sized groups to get a total of 6 fish in each group. Alternatively, the student could also have described a situation in which the 24 fish are somehow divided so that there are 4 fish in each group, leading to a calculation of 6 groups.

Jimmy's teacher asked him to describe a situation in which the number of objects could be represented by  $24 \div 4$ .

Jimmy started his description, shown below. Complete the description so that the number of objects can be represented by  $24 \div 4$ .

A pet store had a total of 24 fish. Joey bought all 24 fish for him and his 3 friends. He shares the fish equally. How many fish did each of them get?



### Score Point 2 (out of 2 points)

This response (Joey bought all 24 fish for him and his 3 friends. He shares the fish equally) demonstrates a thorough understanding of the mathematical concepts. The description correctly provides a context in which the number of fish can be represented by  $24 \div 4$ , 24 fish equally shared by four friends.



Jimmy's teacher asked him to describe a situation in which the number of objects could be represented by  $24 \div 4$ .

Jimmy started his description, shown below. Complete the description so that the number of objects can be represented by  $24 \div 4$ .

A pet store had a total of 24 fish. 6 tanks each  
had four fish  $24 \div 4 = 6$



**Score Point 2 (out of 2 points)**

This response (6 tanks each had four fish) demonstrates a thorough understanding of the mathematical concepts. The description correctly provides a context in which the number of fish can be represented by  $24 \div 4$ .

Jimmy's teacher asked him to describe a situation in which the number of objects could be represented by  $24 \div 4$ .

Jimmy started his description, shown below. Complete the description so that the number of objects can be represented by  $24 \div 4$ .

A pet store had a total of 24 fish. They had 4 fish tanks. How many fish go in each fish tank.

**Score Point 1 (out of 2 points)**

This response demonstrates only a partial understanding of the mathematical concepts. The response contains a partially correct description (They had 4 fish tanks. How many fish go in each fish tank); this description lacks the specificity required to indicate that the total number of fish is divided *equally* between four tanks.

Jimmy's teacher asked him to describe a situation in which the number of objects could be represented by  $24 \div 4$ .

Jimmy started his description, shown below. Complete the description so that the number of objects can be represented by  $24 \div 4$ .

A pet store had a total of 24 fish. The fish will be separated into 4 groups. Six fish are in one group.

$$24 \div 4$$



### Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts. The response contains a partially correct description (The fish will be separated into 4 groups. Six fish are in one group); however, this description is incomplete because it does not indicate division into *equal* groups. The illustration is correct but not part of the written description and therefore not assessed.

Jimmy's teacher asked him to describe a situation in which the number of objects could be represented by  $24 \div 4$ .

Jimmy started his description, shown below. Complete the description so that the number of objects can be represented by  $24 \div 4$ .

A pet store had a total of 24 fish.  $24 \div 4 = 6$

**Score Point 0 (out of 2 points)**

This response is incorrect. The correct procedure is to use a narrative to provide a context where the number of fish can be represented by  $24 \div 4$ . This response instead solves  $24 \div 4$  and, although the calculation is correct, the work is not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task.

Jimmy's teacher asked him to describe a situation in which the number of objects could be represented by  $24 \div 4$ .

Jimmy started his description, shown below. Complete the description so that the number of objects can be represented by  $24 \div 4$ .

A pet store had a total of 24 fish. 6 groups of all written down below.



**Score Point 0 (out of 2 points)**

This response is incorrect. The response presents a visual representation that, while correct, does not address the mathematical concepts embodied in the task. The correct procedure is to complete the narrative description to provide a context where the number of fish can be represented by  $24 \div 4$ .

Mr. Tran needs 96 tiles to cover his kitchen floor. He already has 60 tiles. Tiles come in packages of 4. What is the total number of packages he will need to buy to finish covering his kitchen floor?

**Show your work.**

**Answer** \_\_\_\_\_ packages

### Measured CCLS: 3.OA.8

**Commentary:** This question measures 3.OA.8 because it assesses a student's ability to solve two-step word problems using the four operations.

**Extended Rationale:** This question asks the student to find the total number of packages of tiles that will be needed to finish covering a kitchen floor given the total number of tiles needed minus the number of tiles already present and the number of tiles that come in a package. The student must include a set of computations or visual models to explain and justify each step in the process. As indicated in the rubric, student responses will be rated on whether they show sufficient work to indicate a thorough understanding of solving two-step word problems using the four operations. The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

The correct number of packages needed to finish covering the kitchen floor is 9 and can be determined by using the following methods:

Method 1:

Student subtracts the number of tiles Mr. Tran has from the total number of tiles he needs to finish covering the floor.

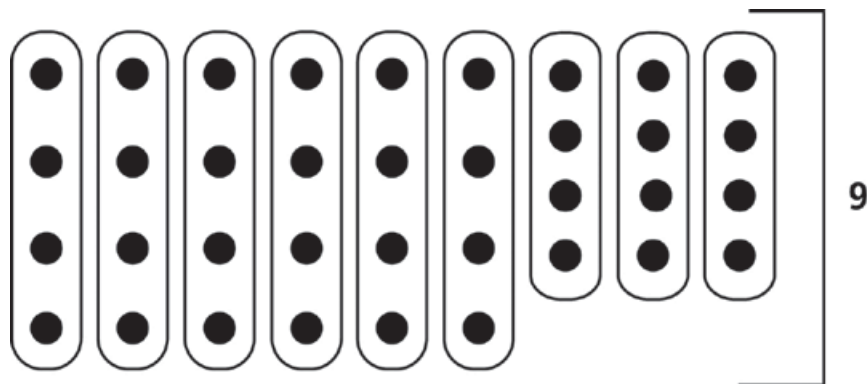
$$96 - 60 = 36$$

Student divides the number of tiles needed by the number of tiles that come in a package.

$$36 \div 4 = 9$$

Method 2:

Student may determine the number of tiles still needed by subtracting 60 from 96. Student then draws a model showing 36 tiles separated equally into 9 groups of 4.



Method 3:

$$96 \div 4 = 24$$

$$60 \div 4 = 15$$

$$24 - 15 = 9$$

Or equivalent work.

Mr. Tran needs 96 tiles to cover his kitchen floor. He already has 60 tiles. Tiles come in packages of 4. What is the total number of packages he will need to buy to finish covering his kitchen floor?

**Show your work.**

$$\begin{array}{r} 96 \\ - 60 \\ \hline 36 \end{array}$$

$$36 \div 4 = 9$$



**Answer** 9 packages

**Score Point 2 (out of 2 points)**

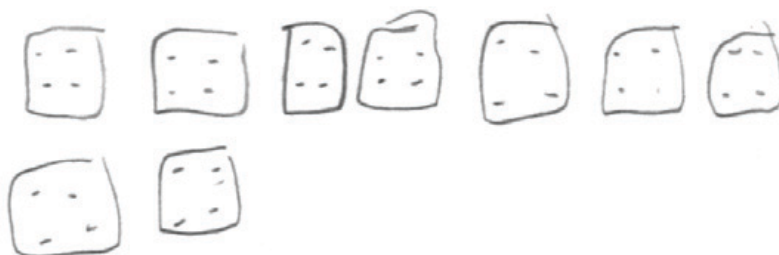
This response includes the correct solution (9) and demonstrates a thorough understanding of the mathematical concepts in the task. The tiles Mr. Tran already has are subtracted from the total number of tiles required ( $96 - 60 = 36$ ). The difference is divided by 4 to determine the number of packages needed ( $36 \div 4 = 9$ ).



Mr. Tran needs 96 tiles to cover his kitchen floor. He already has 60 tiles. Tiles come in packages of 4. What is the total number of packages he will need to buy to finish covering his kitchen floor?

**Show your work.**

9 packages



Answer 9 packages

**Score Point 2 (out of 2 points)**

This response includes the correct solution and demonstrates a thorough understanding of the mathematical concepts in the task. An accurate visual representation (9 groups of 4) is used to determine the correct number of packages. The absence of the calculation determining the number of tiles required,  $96 - 60$ , does not detract from a thorough understanding as the student correctly used a total of 36 tiles in their illustrated representation.

Mr. Tran needs 96 tiles to cover his kitchen floor. He already has 60 tiles. Tiles come in packages of 4. What is the total number of packages he will need to buy to finish covering his kitchen floor?

**Show your work.**

$$\begin{array}{r} 96 \\ - 60 \\ \hline 36 \end{array} \quad \begin{array}{r} 60 \\ + 36 \\ \hline 96 \end{array}$$

**Answer** 36 packages

**Score Point 1 (out of 2 points)**

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response correctly calculates the number of tiles needed ( $96 - 60 = 36$ ); however, the response does not group the tiles to determine the number of packages needed and provides the number of tiles still needed as the solution (36).

Mr. Tran needs 96 tiles to cover his kitchen floor. He already has 60 tiles. Tiles come in packages of 4. What is the total number of packages he will need to buy to finish covering his kitchen floor?

**Show your work.**

$$\begin{array}{r}
 60 \\
 + 4 \\
 \hline
 64 \\
 + 4 \\
 \hline
 68 \\
 + 4 \\
 \hline
 72 \\
 + 4 \\
 \hline
 76 \\
 + 4 \\
 \hline
 80 \\
 + 4 \\
 \hline
 84 \\
 + 4 \\
 \hline
 88 \\
 + 4 \\
 \hline
 92 \\
 + 4 \\
 \hline
 96
 \end{array}$$

**Answer** 8 packages

### Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response contains an incorrect solution (8) but applies a mathematically appropriate process. The response correctly adds 9 sets of 4 to the number of tiles on hand (60) to obtain 96. However, a miscount of the number of 4's added results in an incorrect solution.

Mr. Tran needs 96 tiles to cover his kitchen floor. He already has 60 tiles. Tiles come in packages of 4. What is the total number of packages he will need to buy to finish covering his kitchen floor?

**Show your work.**

$$\begin{array}{r} 24 \\ + 24 \\ + 24 \\ + 24 \\ \hline 96 \end{array}$$

**Answer** 24 packages

**Score Point 0 (out of 2 points)**

This response is incorrect. The response contains an incorrect procedure ( $24+24+24+24 = 96$ ) and an incorrect solution (24).

Mr. Tran needs 96 tiles to cover his kitchen floor. He already has 60 tiles. Tiles come in packages of 4. What is the total number of packages he will need to buy to finish covering his kitchen floor?

**Show your work.**

$$\begin{array}{l} 12 \times 8 = 96 \\ 12 \times 5 = 60 \\ 12 \times 4 = 48 \end{array}$$

48

**Answer** \_\_\_\_\_ **packages**

**Score Point 0 (out of 2 points)**

This response is incorrect. The response contains irrelevant multiplication facts and an incorrect solution (48). This work is not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task.

Four fraction cards are shown below. Complete the fraction on each card so that all four fractions are equivalent.

$\frac{\quad}{2}$	$\frac{3}{\quad}$	$\frac{2}{\quad}$	$\frac{\quad}{8}$
-------------------	-------------------	-------------------	-------------------

**Measured CCLS: 3.NF.3.b**

**Commentary:** This question measures 3.NF.3.b because it assesses a student's ability to recognize and generate equivalent fractions.

**Extended Rationale:** This question asks the student to complete four fractions so that each is equivalent to the others.

One possible set of equivalent fractions is

$$\frac{1}{2}, \frac{3}{6}, \frac{2}{4}, \frac{4}{8}$$

Other equivalent fractions can also be generated from the numbers shown.

Four fraction cards are shown below. Complete the fraction on each card so that all four fractions are equivalent.



**Score Point 2 (out of 2 points)**

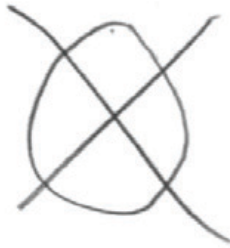
This response includes a correct solution ( $\frac{2}{2}$ ,  $\frac{3}{3}$ ,  $\frac{2}{2}$ ,  $\frac{8}{8}$ ) and demonstrates a thorough understanding of the mathematical concepts in the task. All four fraction cards are equivalent to 1.



## Additional

Four fraction cards are shown below. Complete the fraction on each card so that all four fractions are equivalent.

$\frac{1}{2}$	$\frac{3}{6}$	$\frac{2}{4}$	$\frac{4}{8}$
---------------	---------------	---------------	---------------



### Score Point 2 (out of 2 points)

This response includes a correct solution ( $\frac{1}{2}$ ,  $\frac{3}{6}$ ,  $\frac{2}{4}$ ,  $\frac{4}{8}$ ) and demonstrates a thorough understanding of the mathematical concepts in the task. All four fraction cards are equivalent to  $\frac{1}{2}$ .

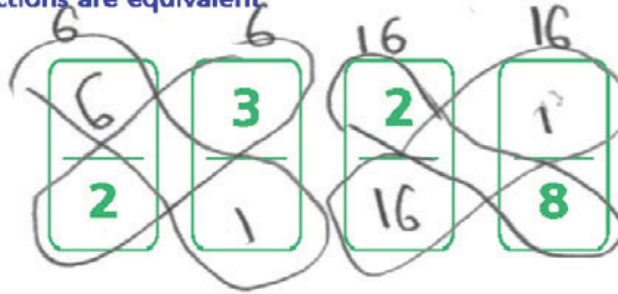
Four fraction cards are shown below. Complete the fraction on each card so that all four fractions are equivalent.

$\frac{1}{2}$	$\frac{3}{3}$	$\frac{2}{2}$	$\frac{4}{8}$
---------------	---------------	---------------	---------------

**Score Point 1 (out of 2 points)**

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response contains two pairs of equivalent fractions ( $\frac{1}{2}$  and  $\frac{4}{8}$ ;  $\frac{3}{3}$  and  $\frac{2}{2}$ ). However, all four fraction cards are not equivalent to each other.

Four fraction cards are shown below. Complete the fraction on each card so that all four fractions are equivalent.



**Score Point 1 (out of 2 points)**

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response contains two pairs of equivalent fractions ( $\frac{6}{2}$  and  $\frac{3}{1}$ ;  $\frac{2}{16}$ , and  $\frac{1}{8}$ ). However, all four fraction cards are not equivalent to each other.

Four fraction cards are shown below. Complete the fraction on each card so that all four fractions are equivalent.

$\frac{8}{2}$	$\frac{3}{8}$	$\frac{2}{8}$	$\frac{1}{8}$
---------------	---------------	---------------	---------------

$\frac{3}{8}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{8}$
$\frac{4}{2}$	$\frac{8}{2}$	$\frac{2}{8}$	$\frac{2}{8}$

**Score Point 0 (out of 2 points)**

This response is incorrect. The response contains no equivalent fractions.

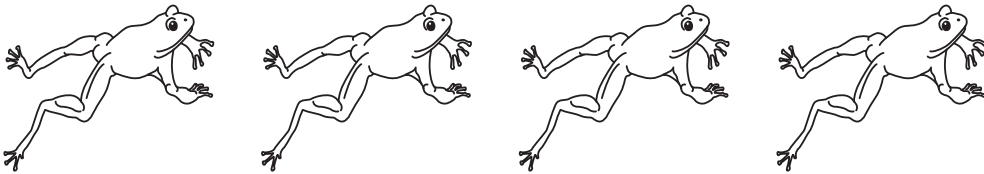
Four fraction cards are shown below. Complete the fraction on each card so that all four fractions are equivalent.

$\frac{2}{2}$	$\frac{3}{4}$	$\frac{2}{6}$	$\frac{1}{8}$
---------------	---------------	---------------	---------------

**Score Point 0 (out of 2 points)**

This response is incorrect. The response contains no equivalent fractions.

In a computer game, players earn points by collecting ducks and frogs. The picture below shows the ducks and frogs Sheila collected the first time she played the game. She earned the same number of points for 6 ducks as she did for 4 frogs.



If Sheila earned 36 points for the ducks, how many points did she earn for each frog?

**Show your work.**

**Answer** \_\_\_\_\_ points

### Measured CCLS: 3.OA.3

**Commentary:** This question measures 3.OA.3 because it assesses a student's ability to use multiplication and division within 100 to solve word problems in situations involving equal groups.

**Extended Rationale:** This question asks the student to find the number of points Sheila earned for each frog, given the information that she earned the same number of points for collecting 4 frogs as she did for collecting 6 ducks, 36. The student must include a set of computations or visual models to explain and justify the description. As indicated in the rubric, student responses will be rated on whether they show sufficient work to indicate a thorough understanding of how to use multiplication and division within 100 to solve word problems in situations involving equal groups. The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

The correct answer is 9 points, which may be determined by:

Method 1:

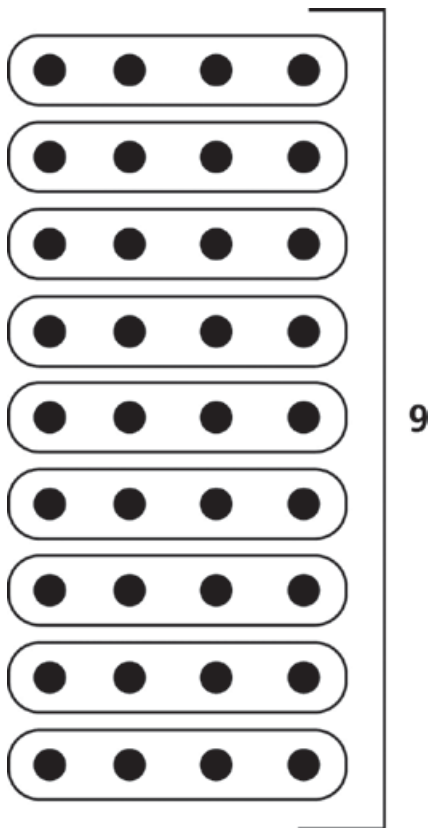
$$36 \div 4 = 9$$

Method 2:

$$4 \times ? = 36$$

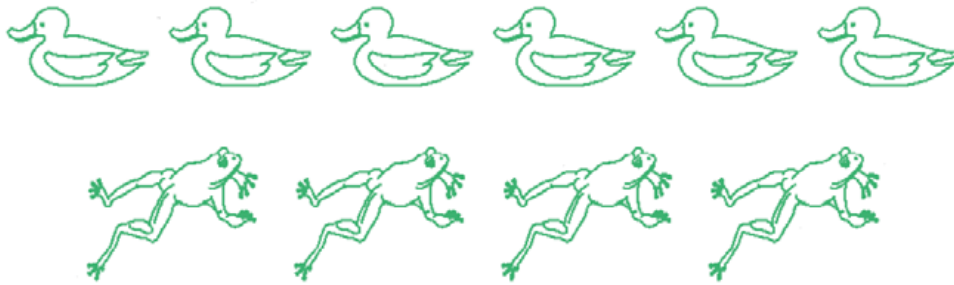
$$? = 9$$

Method 3: Student may draw a model



Or other equivalent work.

In a computer game, players earn points by collecting ducks and frogs. The picture below shows the ducks and frogs Sheila collected the first time she played the game. She earned the same number of points for 6 ducks as she did for 4 frogs.



If Sheila earned 36 points for the ducks, how many points did she earn for each frog?

**Show your work.**

$$36 \div 4 = 9$$

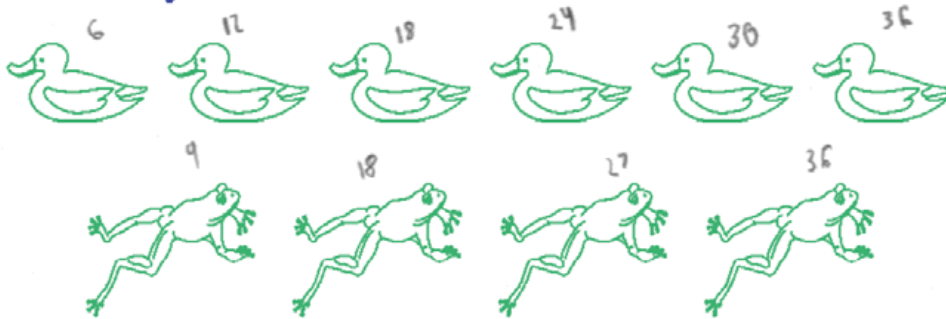
**Answer** 9 **points**

**Score Point 2 (out of 2 points)**

This response includes the correct solution (9) and demonstrates a thorough understanding of the mathematical concepts in the task. The response correctly divides the points earned by the number of frogs ( $36 \div 4$ ) to determine the points earned for each frog (9).



In a computer game, players earn points by collecting ducks and frogs. The picture below shows the ducks and frogs Sheila collected the first time she played the game. She earned the same number of points for 6 ducks as she did for 4 frogs.



If Sheila earned 36 points for the ducks, how many points did she earn for each frog?

**Show your work.**

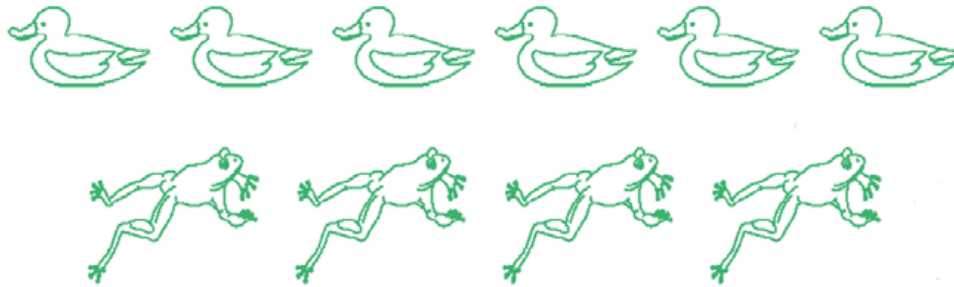
$$\begin{array}{l} 36 \\ 9 \times 4 = 36 \\ 4 \times 9 = 36 \\ \hline 36 \div 4 = 9 \end{array}$$

**Answer** 9 points

### Score Point 2 (out of 2 points)

This response includes the correct solution and demonstrates a thorough understanding of the mathematical concepts in the task. The response correctly divides the points earned by the number of frogs ( $36 \div 4$ ) to determine the points earned for each frog (9).

In a computer game, players earn points by collecting ducks and frogs. The picture below shows the ducks and frogs Sheila collected the first time she played the game. She earned the same number of points for 6 ducks as she did for 4 frogs.



If Sheila earned 36 points for the ducks, how many points did she earn for each frog?

**Show your work.**

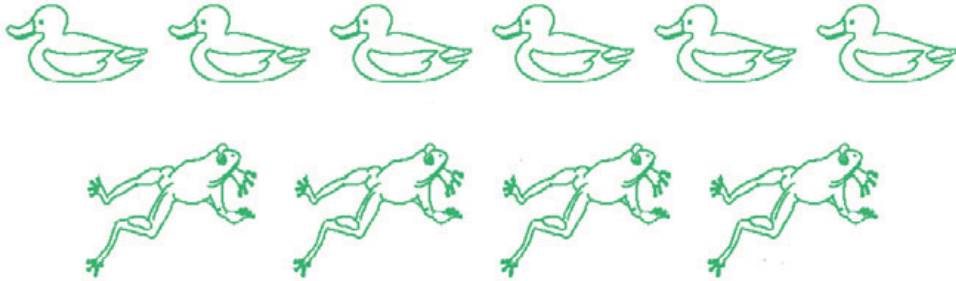
$$4 \times ? = 36$$
$$4 \times 8 = 36$$

**Answer** 8 points

**Score Point 1 (out of 2 points)**

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response contains an incorrect solution (8) but applies a mathematically appropriate process. The response indicates that the number of frogs multiplied by an unknown equals the total points ( $4 \times ? = 36$ ). However, a multiplication error ( $4 \times 8 = 36$ ) results in an incorrect solution.

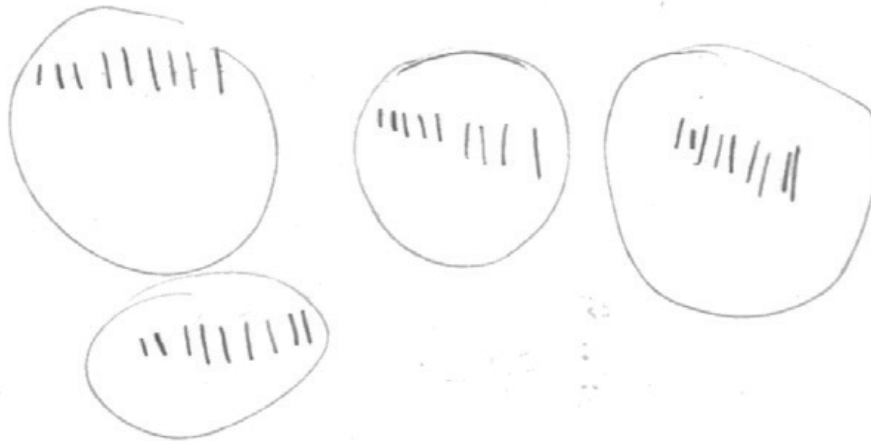
In a computer game, players earn points by collecting ducks and frogs. The picture below shows the ducks and frogs Sheila collected the first time she played the game. She earned the same number of points for 6 ducks as she did for 4 frogs.



If Sheila earned 36 points for the ducks, how many points did she earn for each frog?

$$36 \div 4 = 10$$

**Show your work.**

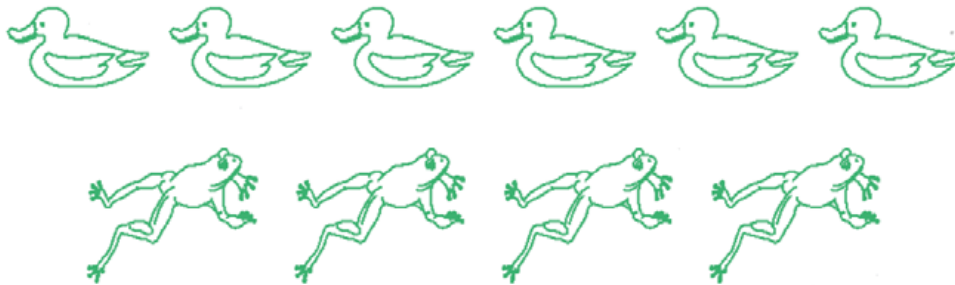


**Answer** 10 points

### Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. The response contains an incorrect solution (10) but applies a mathematically appropriate process. The response divides the total points by the number of frogs ( $36 \div 4$ ) and provides a visual representation of 4 groups of 10. However, a calculation error results in an incorrect solution.

In a computer game, players earn points by collecting ducks and frogs. The picture below shows the ducks and frogs Sheila collected the first time she played the game. She earned the same number of points for 6 ducks as she did for 4 frogs.



If Sheila earned 36 points for the ducks, how many points did she earn for each frog?

**Show your work.**

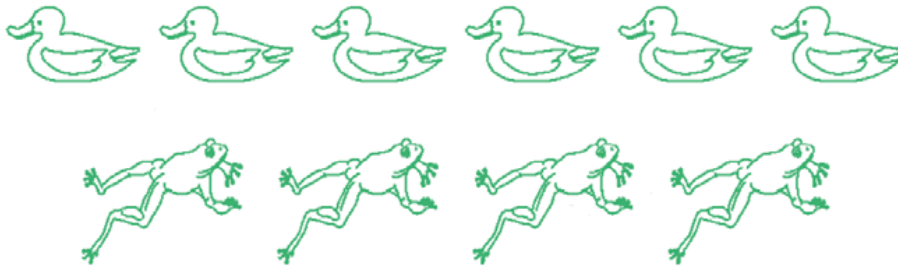
$$4 \times 6 = 24$$

**Answer** 24 points

**Score Point 0 (out of 2 points)**

This response is incorrect. The response demonstrates an incorrect procedure, multiplying the number of frogs by the number of ducks ( $4 \times 6$ ), and indicates an incorrect solution (24).

In a computer game, players earn points by collecting ducks and frogs. The picture below shows the ducks and frogs Sheila collected the first time she played the game. She earned the same number of points for 6 ducks as she did for 4 frogs.



If Sheila earned 36 points for the ducks, how many points did she earn for each frog?

**Show your work.**

Answer 9 points

**Score Point 0 (out of 2 points)**

Although this response contains the correct solution (9), holistically this alone is not sufficient to demonstrate even a limited understanding of the mathematical concepts. The required work is missing.

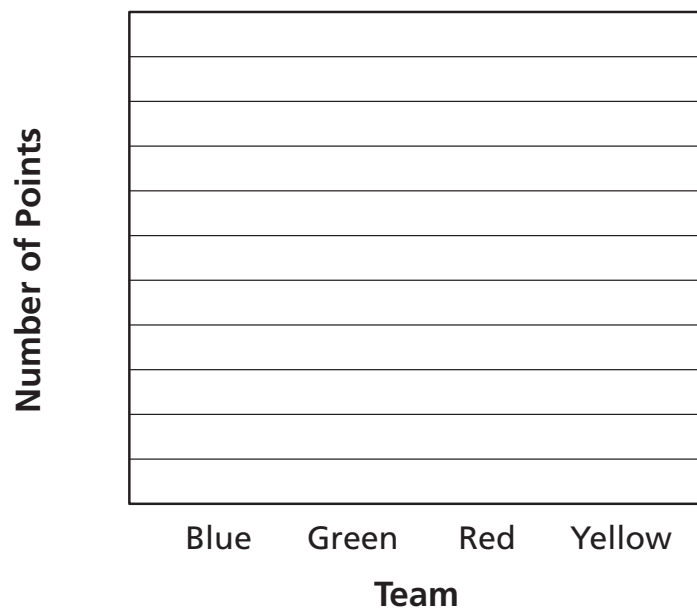
The table below shows the points scored by different teams at the math games.

### MATH GAME SCORES

Team	Number of Points
Blue	40
Green	25
Red	35
Yellow	20

Complete the bar graph to represent the data. Remember to include a numeric scale.

### MATH GAME SCORES



#### Measured CCLS: 3MD.3

**Commentary:** This question measures 3.MD.3 because it assesses a student's ability to draw a scaled bar graph to represent a data set with several categories.

**Extended Rationale:** This question asks the student to complete a bar graph with the data given in a table. As indicated in the rubric, student responses will be rated on whether they sufficiently complete the bar graph to represent a data set with several categories. The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

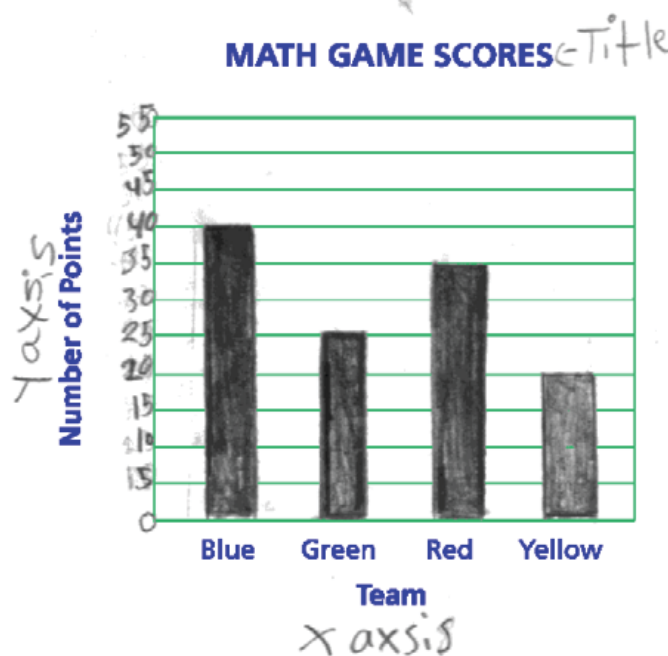
The correct answer is a scale starting at 0 on the y-axis and marked in uniform increments. For blue, a bar should be shaded to reach the 40 mark. For green, a bar should be shaded to reach the 25 mark. For red, a bar should be shaded to reach the 35 mark. For yellow, a bar should be shaded to reach the 20 mark.

The table below shows the points scored by different teams at the math games.

**MATH GAME SCORES**

Team	Number of Points
Blue	40
Green	25
Red	35
Yellow	20

Complete the bar graph to represent the data. Remember to include a numeric scale.



**Score Point 2 (out of 2 points)**

This response demonstrates a thorough understanding of the mathematical concepts in the task. The four bars accurately represent the data in the table, the vertical scale is correct, and the bars are uniformly drawn.



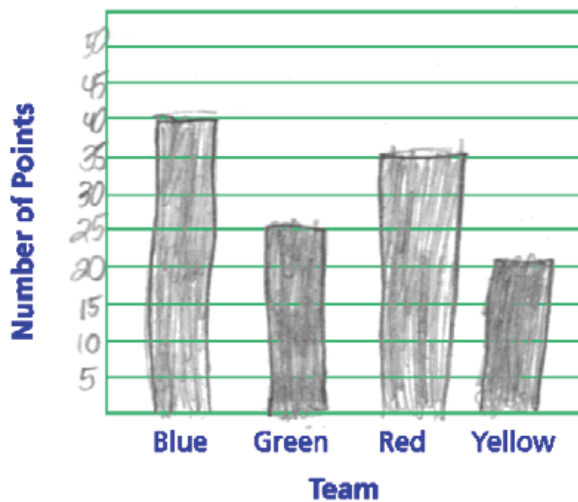
The table below shows the points scored by different teams at the math games.

### MATH GAME SCORES

Team	Number of Points
Blue	40
Green	25
Red	35
Yellow	20

Complete the bar graph to represent the data. Remember to include a numeric scale.

### MATH GAME SCORES



#### Score Point 2 (out of 2 points)

This response demonstrates a thorough understanding of the mathematical concepts in the task. The four bars accurately represent the data in the table, the vertical scale is correct, and the bar widths are suitably consistent. Note that the lack of a "0" label on the vertical axis does not detract from the understanding demonstrated.

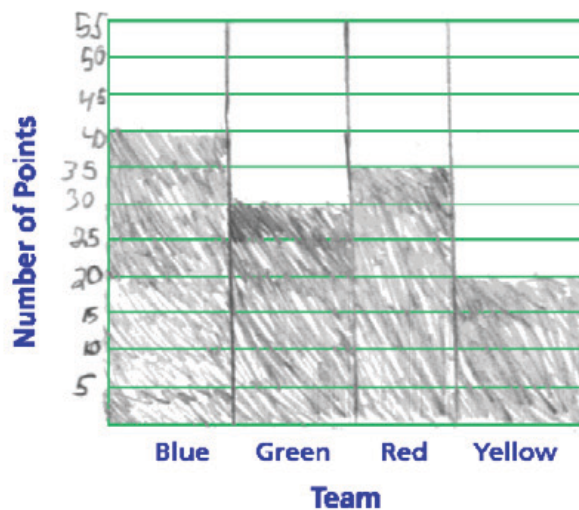
The table below shows the points scored by different teams at the math games.

### MATH GAME SCORES

Team	Number of Points
Blue	40
Green	25
Red	35
Yellow	20

Complete the bar graph to represent the data. Remember to include a numeric scale.

### MATH GAME SCORES



#### Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. Three of the four bars accurately represent the values from the table (Green is incorrectly drawn as 30 points), the vertical scale is correct, and the bars are uniformly drawn. Per [scoring policy #8](#), touching bars are acceptable in Grade 3.

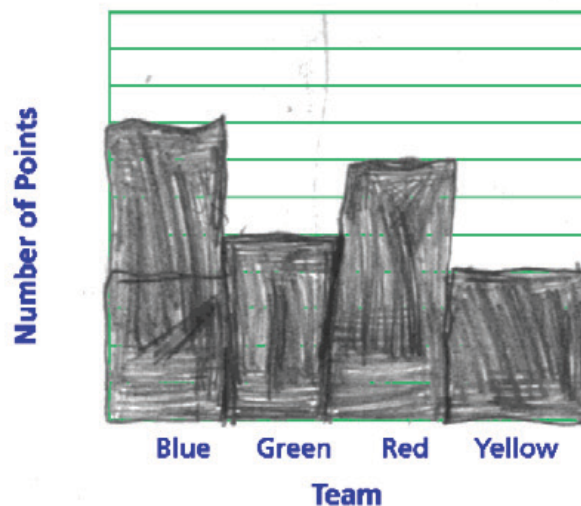
The table below shows the points scored by different teams at the math games.

### MATH GAME SCORES

Team	Number of Points
Blue	40
Green	25
Red	35
Yellow	20

Complete the bar graph to represent the data. Remember to include a numeric scale.

### MATH GAME SCORES



#### Score Point 1 (out of 2 points)

This response demonstrates only a partial understanding of the mathematical concepts in the task. Assuming increments of 5 units, the bar graph is proportionally appropriate for each of the table values (Blue 40, Green 25, Red 35, and Yellow 20) and the bars are uniformly drawn; however, the vertical scale is missing.

The table below shows the points scored by different teams at the math games.

### MATH GAME SCORES

Team	Number of Points
Blue	40
Green	25
Red	35
Yellow	20

Complete the bar graph to represent the data. Remember to include a numeric scale.

### MATH GAME SCORES



#### Score Point 0 (out of 2 points)

This response is incorrect. A pictograph is drawn that does not accurately represent the data in the table. The proportion of the bars is incorrect, as is the vertical scale.

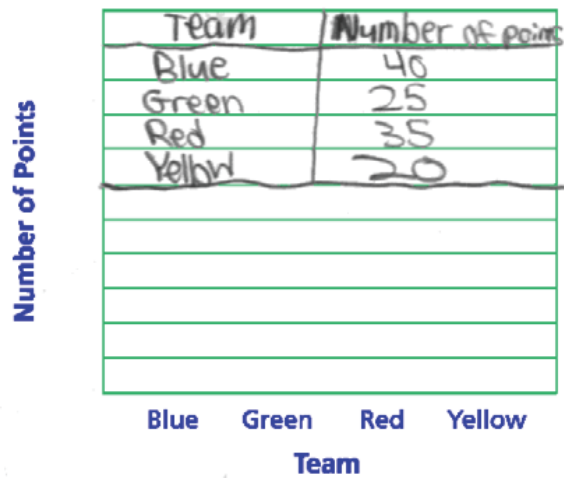
The table below shows the points scored by different teams at the math games.

### MATH GAME SCORES

Team	Number of Points
Blue	40
Green	25
Red	35
Yellow	20

Complete the bar graph to represent the data. Remember to include a numeric scale.

### MATH GAME SCORES



#### Score Point 0 (out of 2 points)

This response is irrelevant. The table is transcribed onto the bar graph area and no bar graph is drawn.

There were 30 students in a school chorus. The music teacher arranged the chorus into 6 equal groups. How many students were in each group?

**Show your work.**

**Answer** \_\_\_\_\_ students

Three more students joined each of the 6 groups. How many students were in the chorus then?

**Show your work.**

**Answer** \_\_\_\_\_ students

### Measured CCLS: 3.OA.3

**Commentary:** This question measures 3.OA.3 because it assesses a student's ability to use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities.

**Extended Rationale:** This question asks the student to find the number of students in each group if the chorus teacher arranges 30 students into 6 equal groups. Then the student must find the total number of students in the chorus if three more students join each of those groups. As indicated in the rubric, student responses will be rated on whether they show sufficient work to indicate a thorough understanding of how to use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities by using drawings and equations. The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

The correct number of students in each group is 5 and the total number of students in the chorus after 3 students are added to each group is 48 and may be determined by using the following methods:

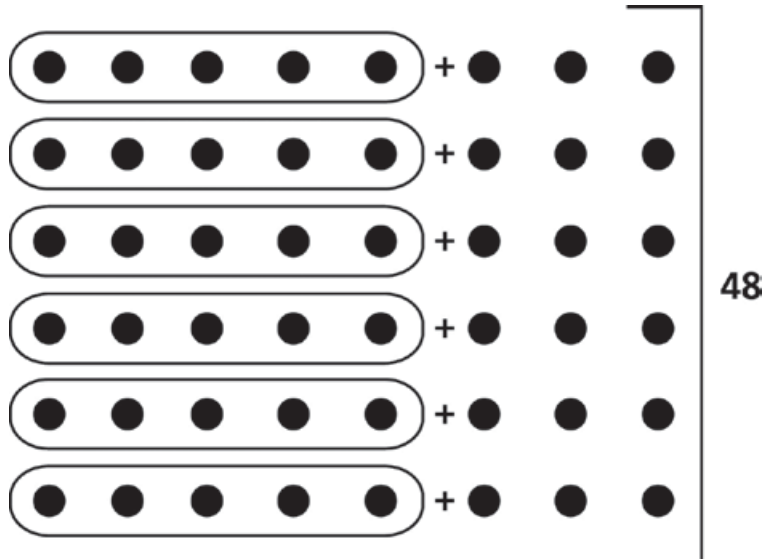
Method 1:

$$30 \div 6 = 5$$

$$5 + 3 = 8$$

$$6 \times 8 = 48$$

Method 2: Student may draw models to represent the calculations shown in Method 1.



There were 30 students in a school chorus. The music teacher arranged the chorus into 6 equal groups. How many students were in each group?

**Show your work.**



$$30 \div 6 = 5$$

**Answer** 5 students

Three more students joined each of the 6 groups. How many students were in the chorus then?

**Show your work.**

total = 30  
factor = 5  
factor = 6

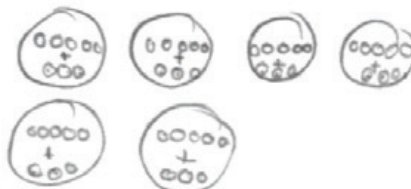
5 kids in  
each group

6 groups

3 more students join  
each group.

$$(5+3) \times 6 = 48$$

8



**Answer** 48 students

### Score Point 3 (out of 3 points)

This response contains correct solutions (5 students; 48 students) with sufficient work to demonstrate a thorough understanding of the mathematical concepts in the task. For the first question, the response contains both an accurate visual representation of students in each chorus group (6 groups of 5) and a correct calculation ( $30 \div 6 = 5$ ). For the second question, the response contains both an accurate visual representation of the total number of students in the chorus (6 groups of 8) and a correct calculation ( $(5+3) \times 6 = 48$ ). Either the visual representations or the calculations would be sufficient work to demonstrate thorough understanding.



There were 30 students in a school chorus. The music teacher arranged the chorus into 6 equal groups. How many students were in each group?

**Show your work.**

$$30 \div 6 = 5$$

**Answer** 5 students

Three more students joined each of the 6 groups. How many students were in the chorus then?

**Show your work.**

$$\begin{array}{r} 30 \\ + 18 \\ \hline 48 \end{array}$$

**Answer** 48 students

### Score Point 3 (out of 3 points)

This response contains correct solutions (5 students; 48 students) with sufficient work to demonstrate a thorough understanding of the mathematical concepts in the task. For the first question, the response contains a correct calculation ( $30 \div 6 = 5$ ). For the second question, the response correctly adds the new students to the existing chorus students to determine the correct solution ( $30 + 18 = 48$ ). The procedure,  $6 \times 3$ , to arrive at 18 total new students does not need to be shown for a thorough understanding.

There were 30 students in a school chorus. The music teacher arranged the chorus into 6 equal groups. How many students were in each group?

*Show your work.*  $30 \div 6 = 5$

*Answer* 5 students

Three more students joined each of the 6 groups. How many students were in the chorus then?

*Show your work.*  $3 \times 6 = 18$

*Answer* 18 students

**Score Point 2 (out of 3 points)**

This response demonstrates a partial understanding of the mathematical concepts in the task. The response contains the correct procedure ( $30 \div 6$ ) and solution (5) for the first question. For the second question, the response correctly determines the number of new students ( $3 \times 6 = 18$ ); however, the 18 new students are not added to the existing 30 students to determine the total students in the choir.

There were 30 students in a school chorus. The music teacher arranged the chorus into 6 equal groups. How many students were in each group?

**Show your work.**

$$\begin{array}{r} \times 5 \\ 6 \overline{) 30} \\ \underline{- 30} \\ 0 \end{array}$$

**Answer** 5 students

Three more students joined each of the 6 groups. How many students were in the chorus then?

**Show your work.**

$$\begin{array}{r} 6 \\ + 3 \\ \hline 9 \end{array} \quad \begin{array}{r} 9 \\ \times 6 \\ \hline 54 \end{array}$$

**Answer** 54 students

**Score Point 2 (out of 3 points)**

This response demonstrates a partial understanding of the mathematical concepts in the task. The response contains the correct work ( $30 \div 6$ ) and solution (5) for the first question. For the second question, the response incorrectly adds 3 students to 6 groups instead of to 5 students. The 9 student total is correctly multiplied by 6, but adding students and groups results in an incorrect solution (54).

There were 30 students in a school chorus. The music teacher arranged the chorus into 6 equal groups. How many students were in each group?

**Show your work.**

$$30 \div 6 = 5$$

**Answer** 5 students

Three more students joined each of the 6 groups. How many students were in the chorus then?

**Show your work.**

$$30 + 3 = 33$$

**Answer** 33 students

### Score Point 1 (out of 3 points)

This response demonstrates a limited understanding of the mathematical concepts in the task. The response contains the correct work ( $30 \div 6$ ) and solution (5) for the first question. For the second question, the work incorrectly adds 3 students to the existing 30 students resulting in an incorrect solution (33).

There were 30 students in a school chorus. The music teacher arranged the chorus into 6 equal groups. How many students were in each group?

**Show your work.**

$$30 \div 6 = 5$$



**Answer** 5 students

Three more students joined each of the 6 groups. How many students were in the chorus then?

**Show your work.**

**Answer** 35 students

**Score Point 1 (out of 3 points)**

This response demonstrates a limited understanding of the mathematical concepts in the task. The response contains the correct work ( $30 \div 6$ ) and solution (5) for the first question. For the second question, the response contains an incorrect solution (35) and the required work is missing.

There were 30 students in a school chorus. The music teacher arranged the chorus into 6 equal groups. How many students were in each group?

**Show your work.**

$$\begin{array}{r} 30 \\ \times 6 \\ \hline 180 \end{array}$$

**Answer** 36 students

$$\begin{array}{r} 30 \\ + 6 \\ \hline 36 \end{array}$$

Three more students joined each of the 6 groups. How many students were in the chorus then?

**Show your work.**

$$\begin{array}{r} 3 \\ + 6 \\ \hline 9 \end{array}$$

**Answer** \_\_\_\_\_ students

**Score Point 0 (out of 3 points)**

This response is incorrect. The response contains incorrect solutions (36 and 9), and the work does not reflect even a limited understanding of the mathematical concepts in the task.

There were 30 students in a school chorus. The music teacher arranged the chorus into 6 equal groups. How many students were in each group?

**Show your work.**

**Answer** 5 students

Three more students joined each of the 6 groups. How many students were in the chorus then?

**Show your work.**

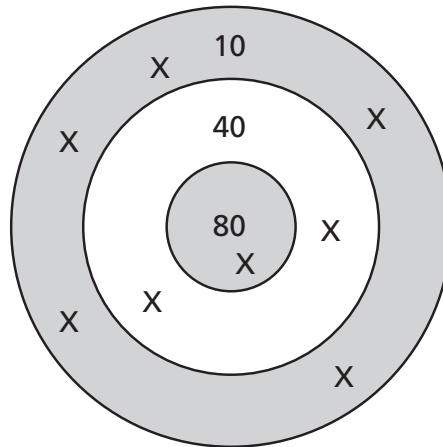
**Answer** 6 students

**Score Point 0 (out of 3 points)**

Although for the first question the response includes the correct solution (5), the required work is missing. For the second question, the response contains an incorrect solution (6) and the required work is missing. Holistically, a correct solution to the first question without any work is not sufficient to demonstrate even a limited understanding.

Charlotte played a computer game that uses a target like the one shown. Each ring of the target is marked with the number of points she earns if her dart lands in that ring.

Each X on the rings shows where one of Charlotte's darts landed the first time she played the game.



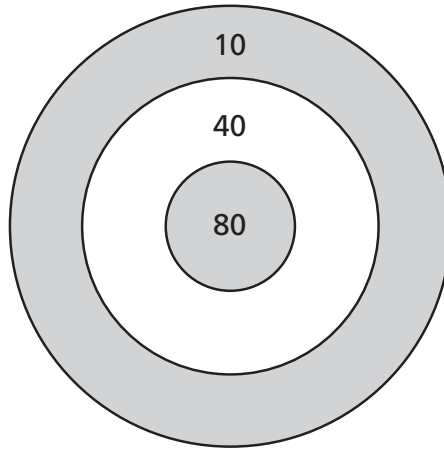
How many points did Charlotte earn her first time playing the game?

**Show your work.**

**Answer** \_\_\_\_\_ points



Charlotte played the game a second time. She threw three darts and scored 160 points. On the target below, show with an X where Charlotte's darts could have landed in order to score exactly 160 points.



### Measured CCLS: 3.NBT.3

**Commentary:** This question measures 3.NBT.3 because it assesses a student's ability to multiply one-digit whole numbers by multiples of 10 in the range 10–90 using strategies based on place value and properties of operations.

**Extended Rationale:** This question asks the student to find the total number of points Charlotte earned when playing the computer game for the first time given the point values where her darts landed. Then the student is asked to place Xs on the dart board where 3 of Charlotte's darts could have landed in order for her to score exactly 160 points. The student must include a set of computations or visual models to explain and justify the description. As indicated in the rubric, student responses will be rated on whether they show sufficient work to indicate a thorough understanding of how to determine the total number of points Charlotte earned and how to determine three addends that sum to 160. The determining factor in demonstrating a thorough understanding is using mathematically sound procedures to lead to a correct response.

The correct answer is 210 points for the first part. For the second part, the correct answer involves placing one X in the region marked "80" and two Xs in the region marked "40."

One possible method to determine 210 involves multiplying  $5 \times 10$  and  $2 \times 40$ , then adding:

$$5 \times 10 = 50$$

$$2 \times 40 = 80$$

$$50 + 80 + 80 = 210$$

To determine the correct placement of Xs for the second part, a possible method is to place three Xs in various regions and then use multiplication to verify the correct total of 160:

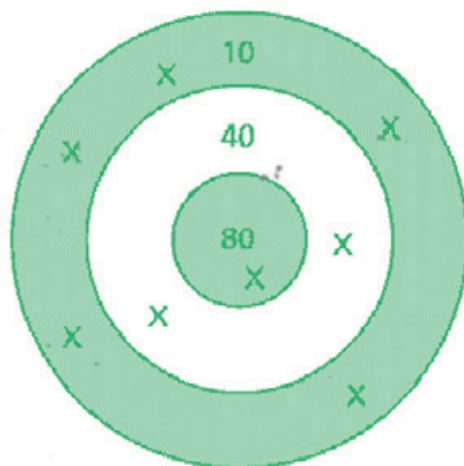
$$2 \times 40 = 80$$

$$1 \times 80 = 80$$

$$80 + 80 = 160$$

Charlotte played a computer game that uses a target like the one shown. Each ring of the target is marked with the number of points she earns if her dart lands in that ring.

Each X on the rings shows where one of Charlotte's darts landed the first time she played the game.



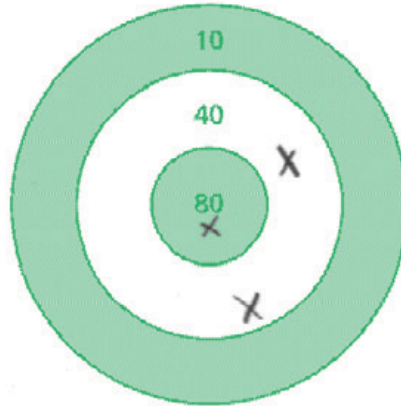
How many points did Charlotte earn her first time playing the game?

**Show your work.**

$$\begin{array}{r}
 5 \\
 \times 10 \\
 \hline
 50 \\
 + 80 \\
 + 80 \\
 \hline
 210
 \end{array}
 \quad
 \begin{array}{r}
 2 \\
 \times 40 \\
 \hline
 80
 \end{array}
 \quad
 \begin{array}{r}
 1 \\
 \times 80 \\
 \hline
 80
 \end{array}$$

**Answer** 210 points

Charlotte played the game a second time. She threw three darts and scored 160 points. On the target below, show with an X where Charlotte's darts could have landed in order to score exactly 160 points.



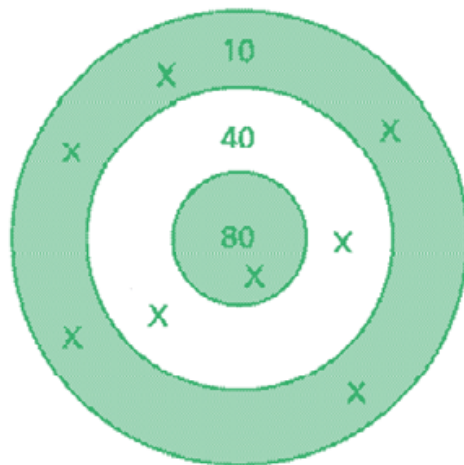
$$\begin{array}{r} 80 \\ + 40 \\ \hline 120 \end{array} \quad \begin{array}{r} 120 \\ + 40 \\ \hline 160 \end{array}$$

**Score Point 3 (out of 3 points)**

This response includes the correct solution and demonstrates a thorough understanding of the mathematical concepts in the task. The response correctly calculates the 210 points earned in the first game ( $5 \times 10 = 50$ ;  $2 \times 40 = 80$ ;  $1 \times 80 = 80$ ;  $50 + 80 + 80 = 210$ ) and correctly places the 3 darts totaling 160 points (two 40s and one 80) in the second game.

Charlotte played a computer game that uses a target like the one shown. Each ring of the target is marked with the number of points she earns if her dart lands in that ring.

Each X on the rings shows where one of Charlotte's darts landed the first time she played the game.



How many points did Charlotte earn her first time playing the game?

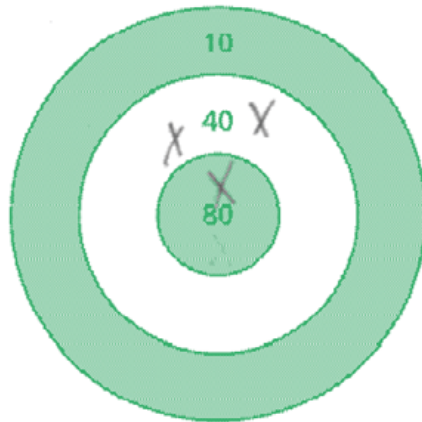
**Show your work.**

$$\begin{array}{r}
 10 \\
 +10 \\
 +10 \\
 +10 \\
 +10 \\
 \hline
 50
 \end{array}$$

$$\begin{array}{r}
 50 \\
 +40 \\
 +40 \\
 \hline
 +30 \\
 130 \\
 +80 \\
 \hline
 210
 \end{array}$$

**Answer** 210 points

Charlotte played the game a second time. She threw three darts and scored 160 points. On the target below, show with an X where Charlotte's darts could have landed in order to score exactly 160 points.

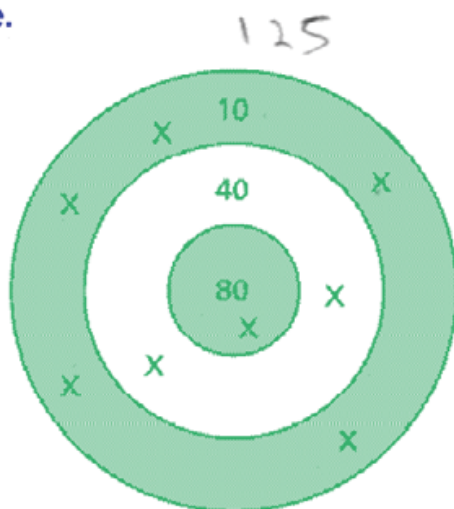


**Score Point 3 (out of 3 points)**

This response includes the correct solution (210) and demonstrates a thorough understanding of the mathematical concepts in the task. The response correctly adds the points earned in the first game ( $10 + 10 + 10 + 10 + 10 = 50$ ;  $50 + 40 + 40 = 130$ ;  $130 + 80 = 210$ ) and correctly places the 3 darts totaling 160 points (two 40s and one 80) in the second game.

Charlotte played a computer game that uses a target like the one shown. Each ring of the target is marked with the number of points she earns if her dart lands in that ring.

Each X on the rings shows where one of Charlotte's darts landed the first time she played the game.



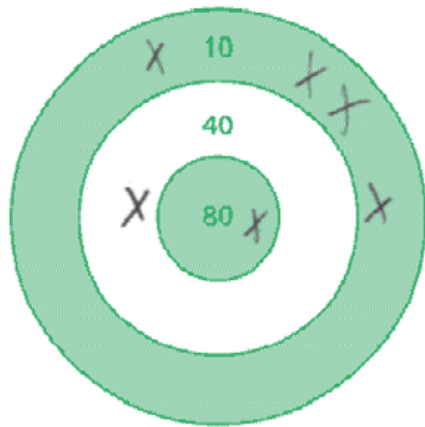
How many points did Charlotte earn her first time playing the game?

**Show your work.**

$$\begin{array}{r}
 10 \\
 10 \\
 10 \\
 10 \\
 +10 \\
 \hline
 50
 \end{array}
 \qquad
 \begin{array}{r}
 50 \\
 40 \\
 40 \\
 + \\
 \hline
 130
 \end{array}
 \qquad
 \begin{array}{r}
 130 \\
 180 \\
 + \\
 \hline
 210
 \end{array}$$

**Answer** 210 points

Charlotte played the game a second time. She threw three darts and scored 160 points. On the target below, show with an X where Charlotte's darts could have landed in order to score exactly 160 points.



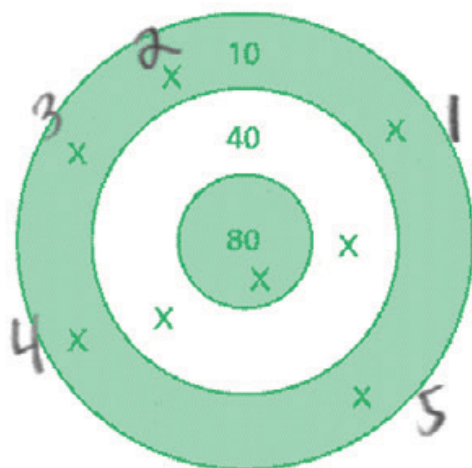
$$\begin{array}{r}
 10 \\
 10 \\
 10 \\
 \hline
 40
 \end{array}
 \begin{array}{r}
 40 \\
 40 \\
 \hline
 80
 \end{array}
 \begin{array}{r}
 80 \\
 80 \\
 \hline
 160
 \end{array}$$

### Score Point 2 (out of 3 points)

This response demonstrates a partial understanding of the mathematical concepts in the task. The response successfully adds the dart values for the first game ( $10 + 10 + 10 + 10 + 10 = 50$ ;  $50 + 40 + 40 = 130$ ;  $130 + 180 = 210$ ) and provides the correct solution (210). The transcription error, 180 for 80, does not detract from the demonstrated level of understanding. However, in the second game, six darts (instead of the required three) are used to total 160 points (four 10s, one 40, one 80).

Charlotte played a computer game that uses a target like the one shown. Each ring of the target is marked with the number of points she earns if her dart lands in that ring.

Each X on the rings shows where one of Charlotte's darts landed the first time she played the game.



How many points did Charlotte earn her first time playing the game?

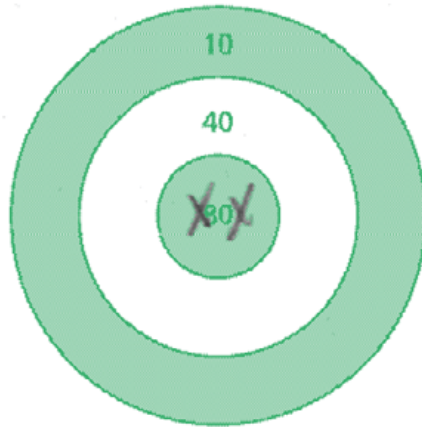
**Show your work.**

$$\begin{array}{r}
 10 \times 5 = 50 \\
 40 \times 2 = 80 \\
 80 \times 1 = 80 \\
 \hline
 210
 \end{array}$$

**Answer** 210 points



Charlotte played the game a second time. She threw three darts and scored 160 points. On the target below, show with an X where Charlotte's darts could have landed in order to score exactly 160 points.

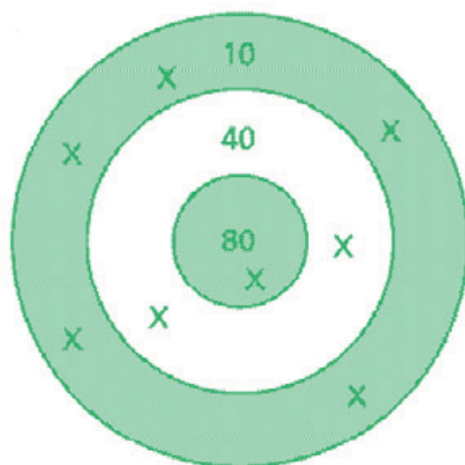


**Score Point 2 (out of 3 points)**

This response demonstrates a partial understanding of the mathematical concepts in the task. The response correctly calculates the dart values for the first game ( $10 \times 5 = 50$ ;  $40 \times 2 = 80$ ;  $80 \times 1 = 80$ ;  $50 + 80 + 80 = 210$ ). However, in the second game, two darts (instead of the required three) are used to total 160 points (two 80s).

Charlotte played a computer game that uses a target like the one shown. Each ring of the target is marked with the number of points she earns if her dart lands in that ring.

Each X on the rings shows where one of Charlotte's darts landed the first time she played the game.



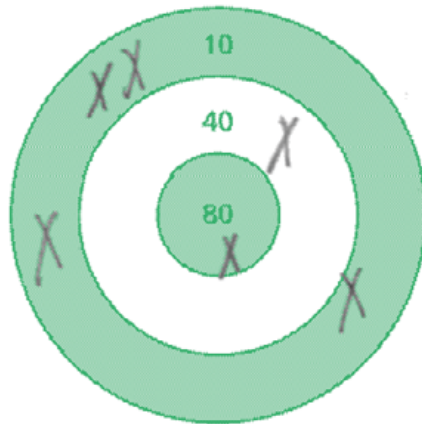
How many points did Charlotte earn her first time playing the game?

**Show your work.**

$$200 + 10 = 210$$

**Answer** 210 points

Charlotte played the game a second time. She threw three darts and scored 160 points. On the target below, show with an X where Charlotte's darts could have landed in order to score exactly 160 points.

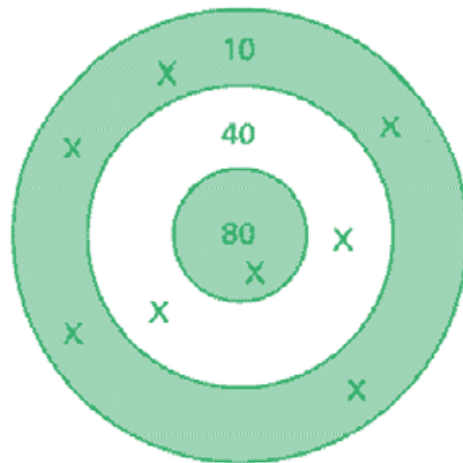


**Score Point 1 (out of 3 points)**

This response demonstrates only a limited understanding of the mathematical concepts in the task. The response contains a correct solution (210), but the required work is limited ( $200 + 10 = 210$ ). No addition of point values to total 200 is shown. In the second game, six darts (instead of the required three) are used to total 160 points.

Charlotte played a computer game that uses a target like the one shown. Each ring of the target is marked with the number of points she earns if her dart lands in that ring.

Each X on the rings shows where one of Charlotte's darts landed the first time she played the game.



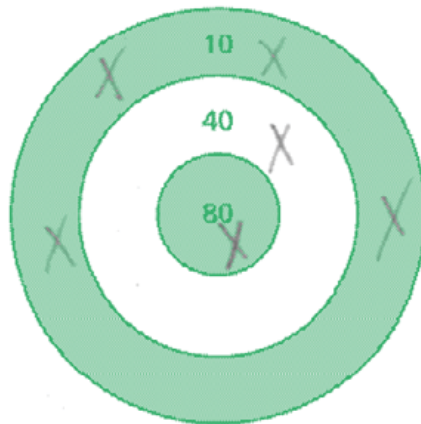
How many points did Charlotte earn her first time playing the game?

**Show your work.**

$$\begin{array}{r} 40 \\ 50 \\ +80 \\ \hline 170 \end{array}$$

**Answer** 170 points

Charlotte played the game a second time. She threw three darts and scored 160 points. On the target below, show with an X where Charlotte's darts could have landed in order to score exactly 160 points.



$$\begin{array}{r} 140 \\ + 20 \\ \hline 160 \end{array}$$

$$\begin{array}{r} 120 \\ + 20 \\ \hline 140 \end{array}$$

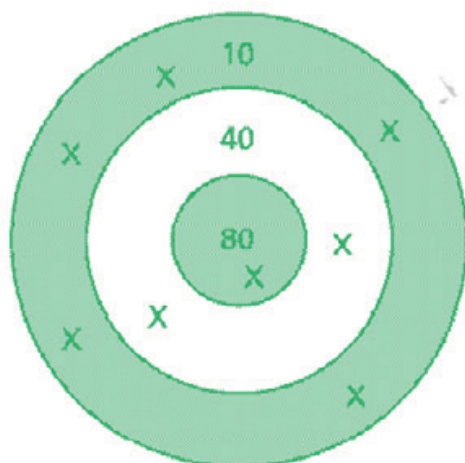
$$\begin{array}{r} 80 \\ 140 \\ \hline 120 \end{array}$$

### Score Point 1 (out of 3 points)

This response demonstrates only a limited understanding of the mathematical concepts in the task. The response contains an incorrect solution (170), but provides a mathematically appropriate process. The dart values are transcribed incorrectly with one value (40) missing; however, the calculation of 170 points is accurate for the values given. In the second game, six darts (instead of the required three) are used to total 160 points.

Charlotte played a computer game that uses a target like the one shown. Each ring of the target is marked with the number of points she earns if her dart lands in that ring.

Each X on the rings shows where one of Charlotte's darts landed the first time she played the game.



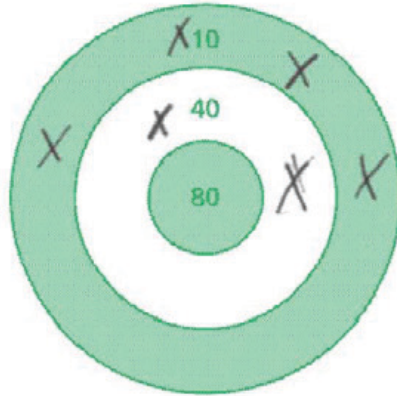
How many points did Charlotte earn her first time playing the game?

**Show your work.**

$$\begin{array}{r} 80 \\ +40 \\ \hline 120 \end{array} \quad \begin{array}{r} 120 \\ +10 \\ \hline 130 \end{array}$$

**Answer** 130 points

Charlotte played the game a second time. She threw three darts and scored 160 points. On the target below, show with an X where Charlotte's darts could have landed in order to score exactly 160 points.



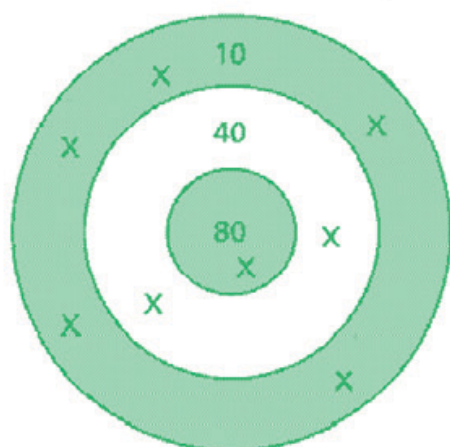
$$\begin{array}{r}
 40 \\
 +10 \\
 \hline
 50 \\
 +10 \\
 \hline
 60
 \end{array}
 \quad
 \begin{array}{r}
 60 \\
 +80 \\
 \hline
 140 \\
 +10 \\
 \hline
 150
 \end{array}
 \quad
 \begin{array}{r}
 150 \\
 10 \\
 \hline
 160
 \end{array}$$

**Score Point 0 (out of 3 points)**

This response is incorrect. The response adds the values identified on the target ( $80 + 40 + 10 = 130$ ) which is not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task. The dart placement in the second game is incorrect; six darts are indicated on the target and the total value is less than 160 points.

Charlotte played a computer game that uses a target like the one shown. Each ring of the target is marked with the number of points she earns if her dart lands in that ring.

Each X on the rings shows where one of Charlotte's darts landed the first time she played the game.



How many points did Charlotte earn her first time playing the game?

**Show your work.**

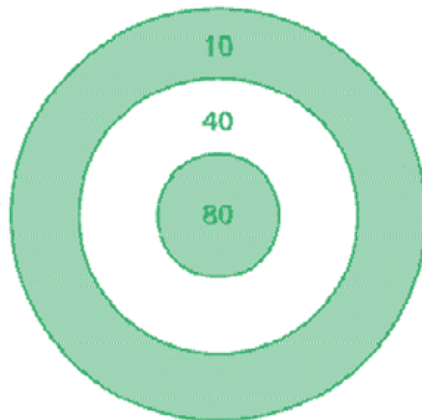
$$\begin{array}{r} 10 \\ + 40 \\ 80 \\ \hline 14 \end{array}$$

**Answer** 14 points

Charlotte earned  
10 points when  
she played the  
game. then she  
earned 40 points  
then she earned  
80 points in  
the game.



Charlotte played the game a second time. She threw three darts and scored 160 points. On the target below, show with an X where Charlotte's darts could have landed in order to score exactly 160 points.



$$\begin{array}{r}
 160 \\
 * 160 \\
 \hline
 160
 \end{array}$$

**Score Point 0 (out of 3 points)**

This response is incorrect. The response adds the values identified on the target incorrectly ( $10 + 40 + 80 = 14$ ). The dart placement in the second game is incorrect (no darts are indicated on the target).

## 2-Point Holistic Rubric

### Score Points:

2 Points	<p>A two-point response includes the correct solution to the question and demonstrates a thorough understanding of the mathematical concepts and/or procedures in the task.</p> <p>This response</p> <ul style="list-style-type: none"><li>• indicates that the student has completed the task correctly, using mathematically sound procedures</li><li>• contains sufficient work to demonstrate a thorough understanding of the mathematical concepts and/or procedures</li><li>• may contain inconsequential errors that do not detract from the correct solution and the demonstration of a thorough understanding</li></ul>
1 Point	<p>A one-point response demonstrates only a partial understanding of the mathematical concepts and/or procedures in the task.</p> <p>This response</p> <ul style="list-style-type: none"><li>• correctly addresses only some elements of the task</li><li>• may contain an incorrect solution but applies a mathematically appropriate process</li><li>• may contain the correct solution but required work is incomplete</li></ul>
0 Points*	<p>A zero-point response is incorrect, irrelevant, incoherent, or contains a correct solution obtained using an obviously incorrect procedure. Although some elements may contain correct mathematical procedures, holistically they are not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task.</p>

\* Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session **completely** blank (no response attempted).

### 3-Point Holistic Rubric

#### Score Points:

3 Points	<p>A three-point response includes the correct solution(s) to the question and demonstrates a thorough understanding of the mathematical concepts and/or procedures in the task.</p> <p>This response</p> <ul style="list-style-type: none"><li>• indicates that the student has completed the task correctly, using mathematically sound procedures</li><li>• contains sufficient work to demonstrate a thorough understanding of the mathematical concepts and/or procedures</li><li>• may contain inconsequential errors that do not detract from the correct solution(s) and the demonstration of a thorough understanding</li></ul>
2 Points	<p>A two-point response demonstrates a partial understanding of the mathematical concepts and/or procedures in the task.</p> <p>This response</p> <ul style="list-style-type: none"><li>• appropriately addresses most, but not all aspects of the task using mathematically sound procedures</li><li>• may contain an incorrect solution but provides sound procedures, reasoning, and/or explanations</li><li>• may reflect some minor misunderstanding of the underlying mathematical concepts and/or procedures</li></ul>
1 Point	<p>A one-point response demonstrates only a limited understanding of the mathematical concepts and/or procedures in the task.</p> <p>This response</p> <ul style="list-style-type: none"><li>• may address some elements of the task correctly but reaches an inadequate solution and/or provides reasoning that is faulty or incomplete</li><li>• exhibits multiple flaws related to misunderstanding of important aspects of the task, misuse of mathematical procedures, or faulty mathematical reasoning</li><li>• reflects a lack of essential understanding of the underlying mathematical concepts</li><li>• may contain the correct solution(s) but required work is limited</li></ul>
0 Points*	<p>A zero-point response is incorrect, irrelevant, incoherent, or contains a correct solution obtained using an obviously incorrect procedure. Although some elements may contain correct mathematical procedures, holistically they are not sufficient to demonstrate even a limited understanding of the mathematical concepts embodied in the task.</p>

\* Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session **completely** blank (no response attempted).

## 2014 2- and 3-Point Mathematics Scoring Policies

Below are the policies to be followed while scoring the mathematics tests for all grades:

1. If a student does the work in other than a designated “Show your work” area, that work should still be scored. (Additional paper is an allowable accommodation for a student with disabilities if indicated on the student’s Individual Education Program or Section 504 Accommodation Plan.)
2. If the question requires students to show their work, and the student shows appropriate work and clearly identifies a correct answer but fails to write that answer in the answer blank, the student should still receive full credit.
3. In questions that provide ruled lines for students to write an explanation of their work, mathematical work shown elsewhere on the page should be considered and scored.
4. If the student provides one legible response (and one response only), teachers should score the response, even if it has been crossed out.
5. If the student has written more than one response but has crossed some out, teachers should score only the response that has **not** been crossed out.
6. Trial-and-error responses are **not** subject to Scoring Policy #5 above, since crossing out is part of the trial-and-error process.
7. If a response shows repeated occurrences of the same conceptual error within a question, the student should **not** be penalized more than once.
8. In questions that require students to provide bar graphs,
  - in Grades 3 and 4 only, touching bars are acceptable
  - in Grades 3 and 4 only, space between bars does **not** need to be uniform
  - in all grades, widths of the bars must be consistent
  - in all grades, bars must be aligned with their labels
  - in all grades, scales must begin at 0, but the 0 does **not** need to be written
9. In questions requiring number sentences, the number sentences must be written horizontally.
10. In pictographs, the student is permitted to use a symbol other than the one in the key, provided that the symbol is used consistently in the pictograph; the student does not need to change the symbol in the key. The student may **not**, however, use multiple symbols within the chart, nor may the student change the value of the symbol in the key.
11. If students are not directed to show work, any work shown will not be scored. This applies to items that do not ask for any work and items that ask for work for one part and do not ask for work in another part.
12. Condition Code A is applied whenever a student who is present for a test session leaves an entire constructed-response question in that session **completely** blank (no response attempted). **This is not to be confused with a score of zero wherein the student does respond to part or all of the question but that work results in a score of zero.**